VOL. XXX. No. 2. AUGUST, 1907.

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# THE GEOGRAPHICAL JOURNAL

## SUMMARY OF CONTENTS.

(*For Details, see over.*)

PAGE

**The Franklin Search: Fiftieth Anniversary of the Sailing of the "Fox"** . . . . . 117

**From the Niger, by Lake Chad, to the Nile.** By BOYD ALEXANDER, Lieut. Rifle Brigade (*Illustrations and Map*) . . . 119

**A Journey from Yün-nan to Assam.** By E. C. YOUNG (*Illustrations, Diagram, and Map*) . . . . . 152

**The Heart of the Southern Alps, New Zealand.** By JAMES MACKINTOSH BELL, Director, Geological Survey, N.Z. (*Illustrations and Sketch-map*) . . . . . 181

**Research Department: The Work of the Past Season.** By Major C. F. CLOSE, C.M.G., R.E., Chairman . . . . . 198

**Reviews** . . . . . 199

**The Monthly Record. Correspondence. Literature and Maps of the Month.**

---

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# The Geographical Journal.

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## CONTENTS—AUGUST.


PAGE

The Franklin Search: Fiftieth Anniversary of the Sailing of the "Fox" . . . 117

From the Niger, by Lake Chad, to the Nile. By Boyd Alexander, Lieut. Rifle Brigade (with 7 Illustrations and Map) . . . . . 119

A Journey from Yün-nan to Assam. By E. C. Young (with 11 Illustrations, Diagram, and Map). . . . . 152

The Heart of the Southern Alps, New Zealand. By James Mackintosh Bell, Director, Geological Survey, N.Z. (with 9 Illustrations and Sketch-map) . . . . . 181

Research Department: The Work of the Past Season. By Major C. F. Close, C.M.G., R.E., Chairman . . . . . 198

Reviews:—

EUROPE—Structural Geography of Iceland. ASIA—Indian Records. Early Enterprise in India. The Santal Parganas. AFRICA—Speculative Ethnology. The Herero and their Land. AUSTRALASIA AND PACIFIC ISLANDS—The Bismarck Archipelago. South Sea Art. GENERAL—Surveying. A New Text-book. Exercises in Physiography . . . . . 199

The Monthly Record . . . . . 208

EUROPE
- The Evolution of the Shannon
- Geography and Demography of Lower Languedoc
- The Language Question in Switzerland

ASIA
- Ethnographic Explorations in Arabia Petræa
- Ascent by Dr. Longstaff in the Himalayas
- Dr. Wegener in Central China
- Survey Work in Seistan
- The Sanpo

AFRICA
- Egypt and the Sudan in 1906
- Geology and Ethnology of Madagascar

AMERICA
- Recent Work of the Geological Survey of Canada
- Survey of the Northern Frontier of Bolivia
- Swedish Expedition to Tierra del Fuego

AUSTRALASIA AND PACIFIC ISLANDS
- Visit to Dutch New Guinea

POLAR REGIONS
- Dr. Charcot's Proposed Antarctic Expedition

GENERAL
- A Rapid Journey round the World

Correspondence—The Inclosure of Common Fields. By F. Haverfield. The Heights of the Central African Lakes and Mountains. By Lieut. T. T. Behrens. The Dar Homr. By C. Percival, Captain, Rifle Brigade . . . . . 218

Geographical Literature of the Month . . . . . 220

New Maps . . . . . 231


## MAPS.


Sketch-map of the Southern Alps of New Zealand . . . . . 182

Map of Route of the Alexander-Gosling Expedition from the River Niger to the Red Sea 236

Map of Route of E. C. Young from Lao-kai to Sadiya . . . . . 236



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The
# Geographical Journal.

No. 2. AUGUST, 1907. Vol. XXX.

## THE FRANKLIN SEARCH: FIFTIETH ANNIVERSARY OF THE SAILING OF THE "FOX."

On the occasion of the fiftieth anniversary of the sailing of the Franklin Search Expedition in the *Fox*, fitted out by Lady Franklin, the following letter was addressed to Admiral Sir Leopold M'Clintock, K.C.B., the commander of the expedition, by Sir George Taubman Goldie, President of the Society, Sir Clements R. Markham, Vice-President, and himself a member of a previous search expedition, and Sir Allen Young, navigation officer of the *Fox*:—

"1, Savile Row, Burlington Gardens, June 30, 1907.

"Dear Sir Leopold M'Clintock,

"In the name and on behalf of the Council of the Royal Geographical Society, we salute and congratulate our Gold Medalist of 1860, and one of the most valued of our colleagues, on a great occasion. For this day is the fiftieth anniversary of the departure of the *Fox* on her memorable voyage.

"We are reminded of your long preparation for your final Arctic service, during which you became the organizer and the creator of Arctic sledge-travelling. You brought your system to such perfection that you and your companion, Lieut. Frederick Mecham, achieved the wonderful journeys of 1853 and 1854—the most wonderful on record. These results afford the strongest proof of the suitability of your travelling equipments.

"With such experience you were the leading Arctic authority when Lady Franklin, forced to complete the search for her husband and his gallant companions at her own expense, secured your services to command the expedition. The voyage of the *Fox* was a great landmark in the history of Geography, whether we consider its conduct, its discoveries,

or its momentous results. There is nothing finer in our naval annals than your firmness and resolution when, after the misfortune of being beset for a winter, and then driven out of the ice in a gale of wind, you coolly turned the ship's head again 'Northward Ho!' You sought no port for refreshment, but turned at once to the battle. Such indomitable pluck commanded success.

"The discoverer of the fate of the *Franklin* bears a name which will never be forgotten by his countrymen. Your book has long been, and will continue to be, one of the classic narratives of our language, recording a great achievement simply and modestly, yet in a way which fills the reader with sympathy and interest.

"It is not for us to refer to your long and valuable subsequent services in the Navy and at the Trinity House; but we may express our deep sense of the value of what you have continued to do in the interests of geography and discovery during a long course of years.

"You have lived to see much valuable and some splendid work achieved in the Arctic Regions, but no one has approached your unequalled journeys, and you still continue to be the greatest, as you are the first, of Arctic sledge-travellers.

"That you may long be spared to us, and that you and yours may continue to enjoy health and happiness, is the earnest wish and hope of your numerous friends and admirers, and, above all, of your old colleagues, who take this propitious opportunity of giving expression to their feelings.

"We are, dear Sir Leopold, yours most sincerely,

"George Taubman Goldie, P. R.G.S.

"Clements R. Markham, V.P. R.G.S.

"Allen Young, Navigating Officer of the *Fox*."

The following reply was received from Sir Leopold M'Clintock:—

"16, Queensberry Place, S.W., July 1, 1907.

"Gentlemen,

"I have the honour to acknowledge the receipt of your letter of the 30th ultimo bearing the signatures of the President of the Royal Geographical Society, Sir George Taubman Goldie, Vice-President Sir Clements Markham, and Fellow Sir Allen Young, the latter being, I believe, my only remaining companion of the *Fox*.

"Such a letter could not fail to raise in my mind feelings to which it is quite impossible to give adequate expression. In the exploration of several hundred miles of newly discovered coast-line in the hope of finding survivors or traces of the lost Franklin Expedition, my duty impelled me to exercise to the utmost of my capacity that high sense of responsibility which is characteristic of our Naval Service, and most loyally was I supported by those associated with me or under my command. I only wish that more of my companions were still living

to share with me the gratification of the generous recognition you have bestowed upon us.

"From my heart I thank you, and most grateful am I to you for the manner in which you have given expression to your feelings towards me. It is most touching to find that one is still remembered after so long a time as half a century.

"I remain, gentlemen, yours most sincerely and gratefully,

"F. L. M'Clintock.

"The President and Council of the Royal Geographical Society."

---

## FROM THE NIGER, BY LAKE CHAD, TO THE NILE.*

By BOYD ALEXANDER, Lieut. Rifle Brigade.

In the short time that is at my disposal to-night, I feel that it would be very difficult to give you a well-proportioned account of so large an expedition. As my object must be to give as complete an account as possible, it will be necessary to cover the ground very quickly, so I regret that the scientific results can be only very lightly touched upon.

The first work we wished to carry out was a systematic survey of a portion of Northern Nigeria. Secondly, to explore Lake Chad, and the rivers between the Niger and the Nile, with the idea of demonstrating the wonderful system of waterways that connects the west with the east; and I think this is fairly well shown when I tell you that in the three years which the journey took to complete, the boats were carried for only fourteen days. Together with these primary objects special attention was to be given to tribal distribution and orthography of native names, and a careful study made of the distribution of the fauna to prove its affinity between the West Coast and the Nile.

The party consisted of my brother officer, Captain G. B. Gosling; Mr. P. A. Talbot; my brother, Captain Claud Alexander; and myself. With me I took my Portuguese collector, José Lopes. We were fully equipped with survey instruments.

Captain Gosling was active in obtaining zoological collections; Mr. Talbot and my brother were responsible for the Nigerian survey, for which they had special qualifications; while I acted as leader; so we were well equipped for the object in view. For the river work we took with us two steel boats, double keeled, 26 feet long and 6 feet wide, drawing 1½ foot for 2½ tons, and made on the Hodgett principle by Forrest Bros. of Wyvenhoe. It took twenty-four men to carry each boat, which was in six sections. It would be hard to exaggerate the importance of these boats to the expedition. In many places they did the work of bullock transport and carriers, that it was impossible to

* Read at the Royal Geographical Society, May 13, 1907. Map, p. 236.

obtain; and it must be remembered that for so large an enterprise, that embraced so many objects, it was necessary at times to support a large number of followers, sometimes two hundred, who had to be paid and fed. For this purpose a great amount of trade-goods was carried, besides a certain quantity of provisions for ourselves, survey instruments, and photographic apparatus.

The expedition left England on February 27, 1904, and arrived at Lokoja on March 24. Here we organized our transport, collected carriers, and put our boats together, supplementing them with five native canoes. This gave time for Talbot and my brother to get the survey instruments into working order. We left on March 31, for Ibi on the Benue, where the survey work was commenced in earnest, the object being to triangulate through the country north to Bauchi, and connect that place with our subsequent work in Bornu. On our arrival at Ibi, nothing seemed to lie before us but a vast expanse of bush, with no point northward to which we could take observations, except the one ridge of Serikin Kudu. Fortunately, however, one day after very heavy rain, there appeared in the distance a dim outline which we knew could be no other than the Murchison range. Angles were at once taken to some of the most prominent peaks.

On April 23, my brother crossed the river to Serikin Kudu, where he put up a subtense of lights to which angles were taken. On May 3 the survey party left Ibi for the Murchison range. It consisted of my brother and Talbot, with about seventy carriers and an escort of fifteen of the West African Frontier Force. After they had left the valley of the river, the country grew more open. This was much like an English park, except that the grass was higher and coarser, and a good deal of scrub was met with at times. At every place, when the weather permitted it, observations for latitude and time were taken. On the third day the party had to cross the river Simanka several times owing to its winding character. After a three hours' march, they arrived at Kakushi, a large stockaded village, and from here, for the first time since they left Ibi, had a splendid clear view of the Murchison range, and took full advantage of it for fixing points. They now entered the country of the Montoil. These, with their neighbours, the Gurkawa and the Yergum, are pagans and cannibals who live at the foot of the Murchison range. The Gurkawa live among the hills which bear their name, and the Montoil in curious groups of hamlets scattered round the foot of Mount Madong. The Yergum dwell in the extreme east, some at the foot, and some high up on the range. The two latter tribes live, as a general rule, in sets of hamlets, each surrounded by a stockade. Most hamlets contain one family with its different branches. The early state of their civilization is shown by the fact that they have not yet evolved as far as the village stage; each hamlet is against every other, each village against the next, and each tribe against its neighbour; the

stronger prey upon the weaker, with the result that the former inhabitants have been driven right up to the peaks of the range, where they now lead a precarious existence. They are very hostile to one another, and are continually raiding their supplanters below to get captives. It was astonishing to see how these pagans had irrigated and cultivated their fields, and taken advantage of every available patch of soil on the hillsides.

On May 9 the party set out straight for Mount Madong, the principal peak to which they had observed at Ibi. At this place my brother was attacked by fever. Talbot tried in vain to ascend Mount Madong, and on May 12 he carried my brother into Wase, where there was a doctor. As soon as Wase was reached, another misfortune befell the party; Talbot became ill with dysentery. At the end of a week my brother was quite recovered, and went out to reconnoitre the Murchison range again, but failed to ascend Mount Madong. During his absence, Talbot, though still very ill, pluckily got up to observe an occultation of the moon, and a most successful result was obtained. Here I must not forget to mention the Wase rock, an immense mass of igneous rock rising sheer out of the plain. It is about 600 feet high, and was probably the tube of a volcano, of which all the rest has been denuded away. It was evident that the best way of connecting the peaks was by triangulation from a measured base at the bottom, and this was eventually accomplished, but not without considerable difficulty owing to the hostility of the Montoils.

The party went on by slow stages round the eastern foot of the Madong mountains, and on June 23 arrived at Langtam, a large pagan village, the capital of the Yergum. Here they managed to get into touch with the people, with the result that the chief and his principal men made pathetic appeals to them to form an alliance to attack three tribes who lived on the top of the mountains, and were the hereditary foes of the Yergum. The party climbed the hill to visit the great Ju-ju place of all the Yergum, the dwelling of a great magician, who pretended to foretell the future to those who brought goats to be sacrificed. He is their last court of appeal in settling disputes and difficulties, and the skins of all leopards and lions are claimed by him. Passing the eastern wing of the Madong mountain, the party found themselves in the Angoss country, where the people live in large villages without any stockades. The country was hilly, with numbers of isolated rocks like that of Wase, and so hard was the ground that the hoofs of the horses were worn down to the quick. In these parts they came across an extraordinary amount of mica; the path followed shone with it like silver, and on either hand there were great peaks of it. In such a stony soil it must have been difficult to grow crops, and the whole land was mapped out into little terraces, built to hold up the rain as it ran down the hill, and prevent the soil from being washed away.

The next important point was Mount Ampang, which is over 4000 feet high. The party climbed this, and found a large plateau at the top covered with populous villages. There was a splendid view; to the north-west lay a magnificent range with peaks 5500 feet high. This has been named the Claud mountains in memory of my brother. From here the progress was slow; several deep rivers had to be crossed, the Gital, the Kamal, and Zungar, with swift currents and much swollen by the rains.

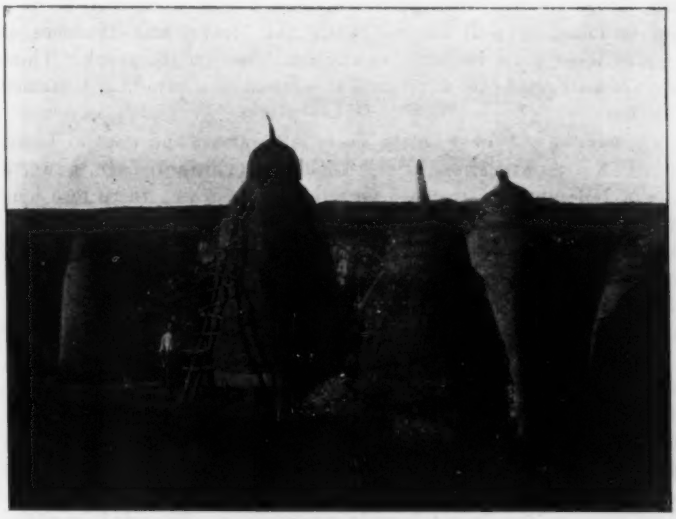
After arriving at Mount Zungaru, nine days were spent in taking observations amid many difficulties from fever, scarcity of food, carriers, etc. On July 26 Bauchi was reached, and here the party stayed three

KERRI KERRI COUNTRY.

days, fixed the position of the town, and made a connection by triangulation with Mount Buli. The expedition then passed through the hilly ironstone country north-east of Bauchi, over the river Gongola.

From the top of a hill called Kalam some curious peaks, in the direction they wanted to follow, were discerned lying some 35 to 40 miles off along the horizon. The village of Alia was reached on August 10. From here, after an eight hours' waterless march, they came to some most extraordinary country belonging to the pagan Kerri-kerri. It is only necessary to describe the town of Gamari, as it will be found typical of all the rest. Amid an alluvial plain rises

a huge circular mass of chalk with precipitous cliffs stretching sheer up on every side. At the top, 300 to 500 feet above the plain, the mass forms an absolutely level plateau, crowded with villages. In the midst of the plateau, again, rises a very steep peak of ironstone or laterite, which for about 50 feet mounts by huge steps or terraces straight as the walls of a house. In the first terrace a series of deep narrow wells have been dug; these completely encircle the peaks at a distance of 10 yards or so from one another. From the top of the peak a most wonderful sight presents itself. One looks down on to the plateau and sees clusters of hamlets, each surrounded by a little wall of matting. Among them, and particularly along the edge of the



KERRI KERRI GRANARIES.

cliff, are curious mud granaries, something of the shape of an elongated beehive, and covered with a neatly plaited straw cap to keep out rain. They are raised above the ground like hayricks or corn-stacks in England, and their height varies from 20 to 30 feet. The grain is extracted by means of a boy, who climbs up a ladder on the outside, takes off the cap, and, jumping in, passes out the corn to men who have mounted to receive it. Scattered over the plateau are ponds of water which never dry up, but this is so chalky that it can only be used for washing.

To reach the plateau from the plain, it was necessary to climb up crevices in which zigzag steps had been cut. At the top the barricade

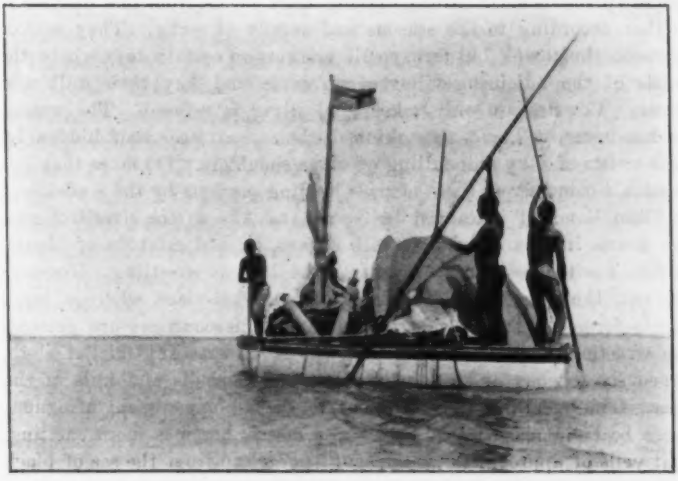
of the stronghold had to be forced, and the plateau was reached in safety. With great difficulty the pacific intentions of the party were explained; then the chief came down, and within half an hour's time carriers and Kerri-kerri were hobnobbing together as if they had known one another for years. The Kerri-kerri are a tall, slim race, and have little negro strain in them. They wear fine clothes made from native cloth, are very good metal workers, and their sword-blades, of peculiar shapes, are finely engraved. From their own account, they have lived on these strange strongholds from time immemorial, and no tradition of an older race, dispossessed by them, has been handed down. Their crops are cultivated on the plains below, but a six months' supply of food is always kept in the granaries already described. Even this plain, however, was well protected, for it was honeycombed with deep trenches, so well covered with thin leaves and branches as to make them quite invisible to any one, even on the brink. These were specially made as a protection against the invading horsemen of Bornu.

The next day, August 12, the party left Gamara and went to Lewe, another Kerri-kerri stronghold. Looking northward from Lewe, a series of tall plateaux stretched for miles, out of which there rose long parallel ridges of crumbling igneous rock. There was not a single point to which observations could be taken. The party therefore decided to double back in a south-easterly direction, and reached Ashaka on August 17. Ashaka was the rendezvous for the expedition after leaving Ibi. José Lopes, with the two steel boats containing all the stores, had already arrived, and Gosling came in ten days later. He had gained the Gongola after an interesting shooting-trip in the Wase district, where he shot a magnificent giraffe, the first specimen, I believe, to be obtained in West Africa. Both Gosling and Lopes experienced considerable difficulty in ascending the Gongola; the river was then at its full, and, flowing as it does at a steep incline, the current was very strong, 8 miles an hour in many places. The whole country was famine-stricken.

And now I must return to my own journey through the centre of Nigeria, where I made zoological collections. On July 30 I arrived at Loko on the Benue, and left the next day for Keffi, travelling through a flat bush-covered country, which, after a two-days' march, becomes broken in places by groups of cone-shaped wooded hills. From Keffi I took a north-easterly direction to a Fulani town named Darroro, at the foot of a lofty hill range, the stronghold of the fierce Kagorra tribe, who are head-hunters. Natives working in the fields are continually being raided by these people, and their heads cut off. Like many of the pagan hill tribes, the Kagorra are strongly built. Their features are coarse and disagreeable, showing a marked resemblance to the tribes south of the Benue. They are keen hunters, and fight with poisoned

arrows. They use small hill ponies, and by means of these keep up a perfect system of communication from one hill to another. They inhabit the hilly country lying between Darroro and Badiko.

After leaving the Kachia and Panda hills, I reached a village named Petti, within the borders of their country. The village consisted of small mud huts, cemented to the projecting rocks of a high hill. The paths to these mud strongholds take all one's energy to climb, and, winding among the steep rocks, are no larger than what a goat would make. In one of their huts I came across a row of human skulls; in others small hill ponies were hidden away. From my camp at the foot of this hill, I watched these curious people squatting in groups



BOAT ON THE RIVER BENUE.

like monkeys basking in the sun, hours at a time, on the great projecting slabs of rock. On one's approach they would suddenly disappear into their rock dwellings.

Lying to the west of the Kagorra country are the Kachia and Panda hills. They are a continuous range, and run in a south-westerly direction, forming the watershed of the Gurara and Kaduna rivers. Living in these hills are the Kachia pagans, amongst whom marriage customs are not recognized. Nothing but leaves are worn, but the women use a curious ornament, encased in brass, 8 inches long, cylindrical in shape, and made of twisted rope. This is hung down over the lower part of the back, and is kept in position by a string round the loins. It has a curious effect, and at a distance gives one the impression

of a tail. The lips of the older women pout out beyond the nose, caused by rounded pieces of wood (the *pelele* of other regions) inserted into holes in the upper and lower lips. Their bodies, even those of the babies, are smeared over with red clay. For three days my route lay through the fertile valley of the Kaduna, and then, turning eastward to Bauchi, I traversed a thick bush country whose predominant features were groups of flat-topped granite hills, sparsely covered with trees, and generally rectangular in shape.

Most of the towns are pagan Fulani. The intermingling of the Fulani race with their conquered pagans makes it difficult now to trace the Fulani shepherd of olden days. He survives only in the cow-Fulanis, who lead a nomad life, living entirely in the bush. These people travel in small bands, driving their flocks from one district to another, according to the seasons and supply of water. They seldom approach the towns, but form small markets on certain days where the people of the adjoining villages can come and buy their milk and butter. Cowries are only taken, and silver is refused. The women are handsome, tall, and pale skinned, their oval faces half hidden by thick twists of silky hair falling over the shoulders. On more than one occasion I came across these nomads holding markets by the roadside.

From Bauchi I journeyed by Goram and Ako to the river Gongola. The towns in this district are all Fulani, with a mixture of Hausa. At Ako I witnessed, for the first time, the Hausas wrestling. Towards sundown the whole town repairs to the market-place, where a large ring is formed. At one side the king and his courtiers are present. The wrestlers are naked except for the short wrestling-skirt of cloth, gorgeously patched and ornamented by cowrie-shells and tails of the chase. The wrestling is carried out to the accompaniment of drums, whose beats increase in volume as the match becomes more exciting, great yells of approval now and again going up from the sea of black heads. The women whom the wrestlers are fighting for cheer them on by a continuous clapping of hands. Before wrestling, hands are shaken and umpires appointed. In every move the wrestling is Romano-Greek, and in all probability the mode has come through from Egypt after the Roman occupation, picked up by the travelling Hausa in the markets and bazaars.

On October 9 I entered Bornu on my way to Yo. A thirsty trek of seven days brought me to the Yo river, sometimes known as the Waube, or Komadugu. The latter is the general name for rivers in this part of Africa. At Geidam, where I struck the river, it is about 40 yards wide, with a sandy bed and an average current from $1\frac{1}{4}$ to 2 miles an hour. This picturesque little river with its winding course is the sole artery of Northern Bornu, so naturally attracts the life of the country to its banks. To the south there lies a barren and waterless belt of 30 miles in width through the length of Bornu. So refreshing

and unexpected is the sight of this narrow river, with its deep waters and clean-cut banks, that it strikes one as being quite out of place in a country of undulating sandy plains, whose surface is broken by thickets of mimosa, cactus, and burnt-up grass. Along the banks there are occasional backwaters, evidences that the river overflows when the rains are heavy in June and July. Near its mouth the river divides into three channels, and navigation into the lake is impeded by a bar of sand, caused, no doubt, by the influence of the north-east wind across the lake. This river is now the boundary between us and the French. The inhabitants, who are the Mobburs, are now found in greater numbers on the French side. This is due in a great measure to the fact that they have not forgotten the oppression of former days, inflicted on them by the Kanuris, whose rule was predominant in Bornu, and is still in a modified form upheld by us.

On October 26, I arrived at Yo, where I found all our stores and the steel boats. This place, about 30 miles by water from Lake Chad, was to be our next base. The journey of the boats had been successfully carried out by Gosling from Ashaka, where they had been taken to pieces by my collector Lopes, and the sections, weighing some 170 lbs. each, carried to the Yo river, a trek of seven days. Here they were put together again in less than two days, and, carrying all the stores of the expedition, descended the river without mishap to the town of Yo.

We must now go back to the survey party. From Ashaka Talbot left for Mount Zogobi, the needle-shaped mountain which he had observed from Mount Bagi. His route took him through the Barburr country past Gulani, a town strongly fortified against the inroads of the Fulani, who have driven the Barburrs to within their present restricted limits. The latitude of Mount Zogobi was fixed. Thence his route lay in a north-easterly direction, and he eventually reached the territory of the Marraghi. The party moved on to a hill near Arris, and found a dead-level plain lay to the north and north-east, not only without hills, but absolutely devoid of conspicuous points, so the only way of surveying across it was by a rigorous traverse, which was accomplished under the greatest difficulties. Owing to the density of the bush and the want of water, the progress was as slow as half a mile to a mile a day. About this time my brother, coming from Gujba, whither he had gone, mapping the while, to arrange transport of the boat's sections from Ashaka, joined Talbot again, and they continued the traverse to Maifoni. At Dallwa, where it was particularly arduous, necessitating their standing at times up to the waist in swamp, my brother, who only recently had had an attack of fever, collapsed, and for the first time gave in. Then a most unfortunate thing happened. A message from two officials came in, requiring his presence at a point on the Maifoni-Yola road. As the question involved the conduct of the survey, with characteristic thoroughness he considered it necessary to attend in

person. He got up from his bed and rode to meet the officials, and then returned unable to stand, and in the grip of the illness for the last time he was carried into Maifoni, where, in spite of the untiring efforts of Dr. Parsons and Talbot, who, as physician and nurse, showed a splendid devotion, after a fight of six weeks, he died November 13, conscious and cheerful to the end.

Five days later Talbot and I left Maifoni with the object of carrying out a vigorous traverse to Kukawa, at which place the labours came to an end that are embodied in the map now published in the *Geographical Journal*.

From Kukawa we went to Kaddai, the new base from which we were to carry out our survey of the lake. Here I must remind you of the valuable work which French officers have done in the exploration and mapping of Lake Chad in recent years; but I think it best to confine myself in this paper to my own explorations, and leave it to geographers to deal as a whole with the information thus placed at their disposal. The removal of the base from Yo, distant 36 miles, necessitated several journeys of the boats, so that that part of the shore-line became well known to us. The boats took a course varying from $1\frac{1}{2}$ to 2 miles from the shore, where the average depth of water was 3 feet, with a hard bottom. This was in December. In March the depth was 4 feet, probably to be accounted for by the lake having received its full complement of water from the Yo river. With the exception of a few island stretches of reed with no firm ground, there is good open water about 20 miles in width at its broadest part, and nowhere does the depth exceed 4 feet. The shore here is quite open, with rough grass frequented by kob, gazelle, and large herds of hartebeest. It has an average width of $1\frac{1}{2}$ mile, and beyond that there are thick woods of mimosa. There are gentle bay formations all along the shore, and the slope of the land to the water is so gradual that there are no banks, and except in one or two places, the lake can be reached without difficulty, for there is scarcely any marsh, and the land is firm with a sandy soil.

We made preparations to gain the eastern shore of the lake. Our crew consisted of eight men as polers. It was necessary, moreover, to travel light, and two camp-beds and enough food for five days completed the equipment. Accordingly, we left the next day with the intention of striking in a south-easterly direction. We soon discovered there was none too much water; only an average depth of $1\frac{1}{2}$ foot could be found. During the first 12 miles it was impossible to go south; a great barrier of dense marsh lay to our right. Hoping to find an outlet, we followed this belt as close as possible, but were eventually compelled to take a north-easterly course, the marsh giving way to continual low-lying land in the form of bays, in many places unapproachable owing to thick mud. Our prospects the first day were anything but bright, and the impossibility of getting into touch with the Buduma did not improve matters.

Towards sundown we sighted a large fleet of canoes lying in a reed-girt bay, and evidently engaged in fishing operations. Here was our chance. They had not observed us, and under cover of the growing darkness we stole silently along under the lee of a promontory, and came within 500 yards of them. Then a great commotion followed. The canoes were drawn up out of the water, and boats and men disappeared into the reeds. The next day the water to our left became studded with innumerable small sandy islands, overgrown with tall grass, and many strewn with shells. Our course now lay in a strait, where from bay to island the distance averaged 2 miles. In the vicinity of the islands, the

BUDUMA CANOE.

bottom was shelly, sometimes firm, but more usually with a layer of soft black mud, varying from 6 inches to unknown depths. Throughout the day a strong north-east wind was blowing. In one way, we were thankful for this, for it scattered the great hordes of mosquitoes that usually made our life a burden to us at night. On account of these pests starwork was impossible, and consequently latitudes had to be taken during the day. After this strong wind, we were dismayed to find the next morning that the water had fallen 10 inches, leaving a depth of barely 9. For several days we toiled along with hardly any progress, the boat often scraping along the thick mud. Our hopes were more than once raised by the sight of what we took to be Buduma settlements on the land to our right, but on approaching these, they turned out to be

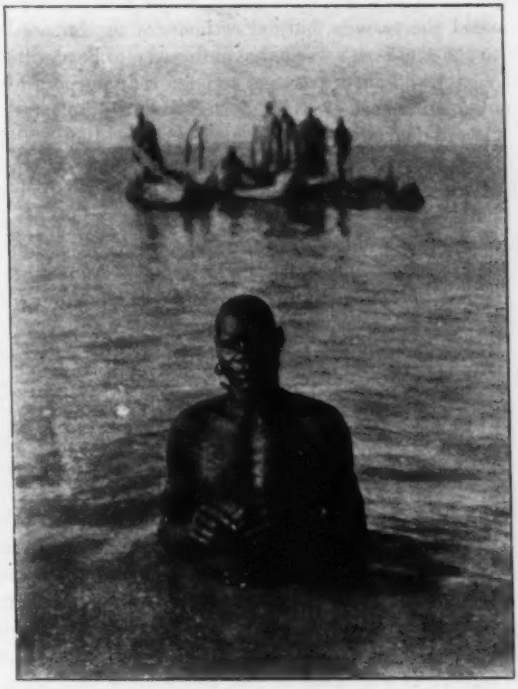
deserted cattle-stations, which consisted of reed-built huts very small in circumference, not more than 4 feet high, and the sides towards the prevailing wind always plastered with mud.

By now we found that our provisions had run out, so to procure food we frantically waded up to our waists in mud after duck, which, before so strange an invasion, immediately took refuge in flight. We therefore had to pay our attention to the flocks of kittiwake gulls which often circled about us, and it was not long before we had spitted and roasted some before the fire in our boat. The following evening, however, our plight became serious, for cartridges were almost finished, and we were obliged to make for rats, which abound on the islands, digging them out of their holes and making humble pie of them, and this is how we lived for another six days, ever hoping to find a passage to the east; but, realizing at last the necessity of bringing our trip to a close, we changed our course to west, and after a tedious winding through a network of islands, we merged into open water with a depth of 2 feet. This continued for a distance of 15 miles till the Yo mouth was reached, where we encamped on a small island, the site of a Buduma fishing-station, which presented a picturesque sight. There was a fleet of some twenty canoes, many full of dried fish; while hanging from frameworks of poles was fish in the process of drying. These stations are "bagas" or markets of the Buduma, where the inhabitants of the Bornu villages repair on certain days in the week and buy the dried fish with their grain, which is not grown by the Budumas. The fish is mainly caught in nets, but the larger ones of 2 feet and upwards in length are speared. Their canoes, made of thick bundles of dry reeds tied together and turned up at the prow, are most picturesque. A good canoe, which takes about a month to construct, will last as long as two years. They are generally 18 feet long, and about 3 feet wide. Lighter canoes are also made, for travelling over shallow water and for escapes from sudden attack.

On December 23 we arrived back at Kaddai, where Gosling awaited us. Here Talbot bade us farewell, taking home with him all the materials for the construction of a map and many zoological collections.

By the middle of February, Gosling, after elephant-hunting near the shores of the lake, where he obtained a fine animal, left with a transport of bullocks for Kusseri, our next objective, and a week later I started with the two steel boats well equipped to endeavour once more to find a way across the lake to the Shari. I again took the direction of the Yo mouth, passing an island on the way, where I counted a herd of sixty hippopotami that had been driven to the lake by the falling of the river. Beyond the river I traced good water to the depth of 4 feet as far as a promontory where the shore-line receded to the north-west, forming a large bay. From this point I struck a north-east by east direction. At a Buduma fishing island I induced two boys to come with me as guides. For 16 miles I found good open water, with

an average depth of 3 feet, and then my course lay through a mass of small islands, with a depth of 1 foot over unfathomable black mud. We struggled on for 10 miles, the men often wading and pushing up to their chests in mud. Then the depth of the water decreased to 6 inches, and as darkness would be falling in two hours, with a supreme effort, we just managed to get the boats in time to an island some 800 yards distant. The next morning I found that we were near the east shore of the lake, for there were horsemen to be seen on the land



BUDUMA, LAKE CHAD.

about a mile beyond the island. I also found that the two Buduma boys had taken advantage of the nearness of the land, and had decamped during the night with the blankets of two of the men. We were all astonished, for there were their footsteps in the mud, where our men had waded to the chest, so that they had run over the mud like moorhens.

My next course was in a south-easterly direction, among innumerable islands, through which I struggled for fourteen days. My difficulties

were increased by the Harmattan, which was blowing very strong at this time. It would rise daily at 9 a.m. and by twelve o'clock the sun would be blotted out by a dense, damp mist, through which we had to grope our way, miserably cold. To show how strangely the water shifts with the wind, one morning, in retracing our course of the evening before, we found the water had gone, leaving numbers of fish of enormous size, some 4 feet long, stranded. As I could find no passage southward, and my men were worked out, I decided to retrace my route to Kaddai and refit for another attempt.

On March 20 I took the same course as our first journey, hoping still we had missed the passage, but our estimate of the impassability of the reed-belt to the south-east was only confirmed; to be absolutely certain, I decided to try and cut a passage, and for that purpose returned to a point about 5 miles east of Kaddai that seemed the most favourable. On the outward journey we came upon a large Buduma fishing fleet for the first time. As we were in great need of a guide, we made in their direction. At first they mistook us for other Budumas, whom they considered as easy prey; for it is their habit to plunder one another when they get the chance. Accordingly, they closed up ready for attack. But soon they realized their mistake, and the tables were turned. Before we could get up to them—and the crews of the boats were straining every nerve—many of the boats burst out into flames, and the Budumas, swimming like otters underneath the water, disappeared into the reeds. The boats were piled up with dried fish, and hidden underneath straw mats we found four slave boys, who were the victims of a traffic carried on between the Budumas and Tubus. They were in a shocking condition, and we took them back and released them at Kaddai.

But to return to our attempt to cut through the reeds. We worked steadily for two days, cutting a distance of about 800 yards, and beyond that I waded a mile, but there was no end to the reeds and "maria" bush. On this journey we came upon a most strange discovery, actually within our course. Sunk just below the surface were the remains of a boat, which the boys hailed at once as those of a white man's, and they were right. It was made of oak, and some 8 feet long, and must have been in this position for years. I can only think it was the English-built boat which the traveller Overweg is known to have taken out with him some fifty years ago.

I now abandoned this my third attempt, and once more returned to Kaddai. When within half a mile of the shore, we found the water had disappeared, and as it was late, and we were too exhausted to attempt to drag the boats over the intervening mud, the men slept in the boats, and my bed, with mosquito net adjusted, was put up in 6 inches of water, and that night I slept on the floor of the lake. In the morning the water rose earlier than I did, and I had just time to

get out of bed as the lake was getting in. The wind was now blowing, and after waiting for two hours there was enough water to carry us in.

The next few days were occupied in taking the boats to pieces. In the mean time I trekked by the shore-line of the lake due south, and explored every corner in the hopes of finding an outlet, and it was not till I discovered a Buduma fish market, called the Kaua Baga, or Seyorum, 25 miles from Kaddai, that I once again saw open water. Between Kaddai and this Baga the whole shore-line is a vast reed bed, and no water for miles can be seen, but large billowing clumps of maria bush 12 to 20 feet high alternating with tall reed.

CUTTING THROUGH REEDS, LAKE CHAD.

Desertion and sickness amongst my party became rife, and I found myself left with only seven men. By many tedious journeys, carrying the sections along the shore of the lake, over rough ground and marsh, I eventually, after one and a half months, got everything up to the Kaua Baga. On reconnoitring the water from this place, I found a depth of 4 feet, and that it was nothing more than a large bay, enclosed on every side by great belts of reed 5 to 6 feet high. A day's cutting through the reeds and maria bush for nearly 2 miles in a north-east by east direction brought me into a series of large bays of the same aspect as the first. Here the depth was 3 feet over very pale grey mud. The next cutting, 6 miles in length through tall reed growth, papyrus, and maria bush as far as the eye could reach, occupied two

days. During these operations we were obliged to spend the nights huddled up in the boats. Sleep was out of the question. We were attacked by hordes of mosquitoes, and we prayed for the morning to come. Many of the men, maddened with pain, preferred to sit up to their necks in water all night. I observed three species of mosquito, one as large as a small fly, very dark, and with a transparent body, which grew to enormous proportions when distended with blood. In spite of all these mosquitoes, I never experienced a day's fever when on the lake.

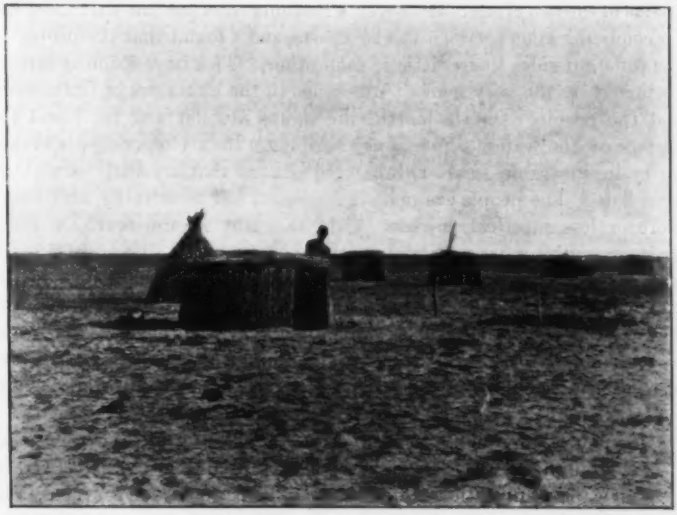
In the course of the work the men discovered a gigantic turtle, nearly 100 lbs. in weight, with a shell of a pale lemon colour. On getting through the reeds we found good water, averaging a depth of 5 feet. The aspect of the lake was now quite different from that of the Yo basin. The small, low, flat islands of the latter gave way to big island stretches, which formed continual promontories ahead, overlapping one another on either side of our course, with channels sometimes not more than 100 yards wide; at other times forming deep bays as much as 2 miles in width, lined with belts of dark green maria 10 to 30 feet in height, and relieved by the reddish-brown feathery branches of a thornless acacia. Up to this time the Budumas had held severely aloof, but now a kachella, or chief, of a large fishing fleet we met saluted us, and offered to show us the way to the other side. On the way he took us to his island, Karraragga, where we rested for two days. This island presented a very fertile appearance; the delicate green of young mimosa leaf was a pleasant sight after the sand-swept stretches of Bornu, and large herds of cattle roamed about at will. The kachella's town consisted of reed-built huts, conical in shape, right down to the ground. Each dwelling had its low round mosquito-proof house covered with close-woven matting.

The Buduma, or Kuri, as the Arabs call them, all speak Kanuri. They come close to the Kanembu, with whom they intermarry. The men are tall, often over 6 feet in height, with well-developed heads and foreheads, but blunt noses, and living as they do on fish, their skins are very sleek and oily. The women are small, and resemble the Kanembu in their headdress—well-oiled plaits of hair hanging down all round the head, with a raised ridge down the centre, and they ornament the twisted curls with shells and silver rings.

On the fifth day, I arrived at Wunnda, a Kanembu town on the east side of the lake, a most desolate-looking country, full of sand-dunes covered with scrubby mimosa. From here I followed the shore for some 25 miles, and then a south-westerly course brought me eventually to the mouth of the Shari. This course was made complicated by extensive belts of maria that frequently closed together and made the waterway winding and narrow. In these channels we found 9 to 12 feet of water. About 12 miles before reaching the Shari mouth, one leaves the great

sombre maria belts behind and comes out into magnificent open water, and Chad for the first time assumes the grandeur of a lake.

Before leaving Lake Chad, I will attempt to give a general idea, based upon the observations I was able to make. As regards the size, I made it considerably less than it was formerly supposed to be. For instance, the northern part, which used to be marked on the maps as 60 miles across, I found to be not more than 40 miles, and my journey across the centre made it about 70 miles. There is an idea that the lake is drying up, but my opinion is that it does not alter very much, and I believe that the supposed greater original area is simply



BUDUMA CATTLE STATION.

due to inaccurate survey, and partly to the fact that the villages on the Bornu side are several miles distant from the lake, which has given the impression that these determined a former shore-line. But I think that the sole reason for their position is one of security, for, as there are no containing banks, and the land and water almost level, the Harmattan, which causes the water to flow 600 yards over the land with an ordinary wind, drives it as far as 2 miles when the wind is strong. Besides, I was told by the King of Kaua, a town situate 11 miles from the lake, that in a great flood twenty years ago the water had reached as far as the town, and in another seven years ago it had risen past it and covered the plain as far as a place called Mongonnu. While the floods lasted, the Budumas went up in their boats and established a fish-

market just outside Kaua. Now, on the eastern shore, where there are good banks, and the water is not influenced by the prevailing wind, there are many villages close to the lake.

Another fact that has perhaps created the impression that the lake is decreasing, is that chains of islands that once were separate are now more or less joined together by marsh. But I think that this may very likely be due to the silting up of mud and sand against the obstruction of the islands by the opposing influences of the Yo and Shari, the two rivers that feed the lake. In fact, my observations go to show that the lake is practically two lakes, divided by the 25 miles or so of marsh and maria bush that I attempted to cut through, and these form the separate basins of the two rivers. Moreover, a Buduma chief told me that there was no communication between the two parts, and I found that the people on the different sides knew little of each other. This impression is further borne out by the very marked difference in the character of the scenery and the people. On the north, the shores are flat and bare, and the surface of the water, which is nowhere more than 4 feet deep, is broken up by innumerable small uninhabited islands that are little more than sand-flats. The people are neither numerous nor flourishing, and lead a more or less piratical, lawless existence. But in the south or Shari basin, everything has a more flourishing appearance. The depth of the water is from 5 to 9 feet, and the islands, which form prominent features, are fertile and thickly inhabited. Everywhere the maria tree grows luxuriantly, and its close dark foliage gives a sombre character to the scenery. This is the real home of the Buduma, who are a prosperous enlightened people, gaining their wealth by fish and potash, and counting it in numbers of wives, slaves, and herds of cattle.

Previous to my work on Lake Chad, I had the fortune to witness a Tubu raid upon the Mecca caravan. At that time the Yo districts were in a most unsettled state; natives went about fully armed, and only travelled by night, for fear of the Tubus, who were on the war-path. These people are the nomad robbers of the Sahara, and lead a camp life. Armed with long spears, and mounted on small quick ponies and camels, they cover long distances, concentrating suddenly when a raid is contemplated, afterwards to scatter and as quickly disappear. Many of the lawless Mobbur are their worthy allies, acting as spies, and sharing a portion of the spoils. While the last great Mecca caravan was travelling through this country, escorted by the Kachella of Yo and his horsemen, it was heavily ambushed near Bulturi, a two days' march from Yo. The Mobburs opened the attack by flights of poisoned arrows, while the Tubu horsemen charged on the flanks, cutting off numbers of the flocks of the caravan, which spread over 2 miles of road, and numbered seven hundred people and nearly a thousand cattle. With the loss of twelve men and thirty horses killed, the Kachella, who had eight spear-wounds, with his hundred horsemen, kept the enemy

at bay, and, under the protection of darkness, brought the harassed caravan into Bulturi, where for five days the Tubus hemmed it in. On the fourth day the Kachella managed to get a runner through to me, and begged me to come and rescue him. Accordingly, with all the arrow-men and horsemen I could muster at Yo, I reached Bulturi in time to relieve him. At daybreak we moved out of the town, prepared to fight our way back to Yo. It was splendid to see the Kachella, man over 6 feet in height, mount his horse, and receive the homage of his warriors. First came troops of arrow-men, who silently advanced and shook their bows at him; then the horsemen, clad in cloaks ornamented with patches of colour, upon horses dressed in thick arrow-proof coats, came on in line, and, raising their spears above their heads, formed round him. For nearly two days a running fight ensued, and the caravan toiled painfully along, enveloped in the dust of charging horsemen. It was a picturesque sight. Whole families were there, driving their flocks, and carrying with them all their worldly belongings, and their children, perched on the backs of bullocks and camels. Amongst this pilgrimage there travelled pale-faced Fulanis, Hausas from Sokoto, handsome dark-skinned people from Melle and Timbuktu, and many Mallams or priests, turbaned and clothed in white, walked, calm and heedless of the danger, incessantly telling their beads. When close to Yo the Tubus cleared off, and the Kachella's warriors concentrated and advanced past me in a long line towards the town, and then the women and childen crowded round the king, asking the news. All night long the hours were broken by the wail of women calling upon their dead men to return.

To go back to the forward movement of the expedition. On May 26, after three months' exploration of the lake, I reached the delta of the Shari, which is composed of two main channels and three smaller ones. In May the main stream had 3 feet of water at the mouth. Before reaching the delta, the isolated rock, Haja-el-Hamis, barren and volcanic, meets the eye. The Kuri or Buduma, who live at the Shari mouth, say that seven years ago, during the rains, the lake washed the sides of the rock, which is some 4 miles away. Ascending the Shari, then at its lowest, with fine steep banks and an average width of 500 yards, we travelled through the land of the Kotokos, the giants of the Sudan; and at Gulfei, the big Kotoko chief, some 6 feet 3 inches in height, received us with all his infantry and horsemen. Like all the Kotoko towns, Gulfei is extremely well built, surrounded by a thick mud wall, some 15 feet in height, and many of the houses are two-storied. They are generally built on rising ground, with the king's quarters on the highest point, where a drum is kept to give the alarm. Many of them are in ruins since the invasion of the Kotoko country by Fadre-el-Allah, Rabeh's son. The people are industrious, cloth making and dyeing, fishing, and farming occupying their time.

After leaving Fort Lamy the river has a winding course, with an average width of 800 yards, now and again widening out to a mile. In places the banks are well wooded, and remind one forcibly of our English woodlands, with well-grown trees, shady glades, and green grass underfoot, the resort of game and much bird life. Throughout its entire course the river flows through a very flat country, much of which is under water during the heavy rains. Away from the banks the trees are mimosa, which in the neighbourhood of Fort Archambault give way to Senegambian brush growth, and hitherto sandy soil becomes rich and of a reddish colour, which lends a picturesque appearance to the steep banks of the river. By the middle of June the river rises considerably, and by July, when the rains become continuous, it rises rapidly about 10 inches a day.

Beyond Miltu the flat expanse of country is for the first time broken by an isolated group of wooded ironstone hills, known as the Togbau, about 300 feet in height, abutting on the left bank of the river. From the top a vast view of a barren country presents itself, and my mind was at once carried back to a similar occasion, when I viewed the landscape from the top of the Keffi hills in Nigeria, and I could not help being forcibly struck by the contrast of the two scenes. There as far as the eye could reach stretched wide fields of yellowing corn, whose surface was often broken by clusters of hamlets where dwelt the happy harvesters, while here on all sides to the distance lay a barren stretch of bush and sand.

From Fort Lamy onwards the Shari region is thinly populated. Between Busso and Fort Archambault there are no villages, and the magnificent river flows through a silent land, untouched by traffic of any kind, and one can travel for days without meeting a single native canoe. Regarding the natives, those on the right bank belong to the kingdom of the Bagirmi people, who have carried on for years a systematic slave-raiding against the Sara tribes, or Kurdi, as they are known to the Bagirmi; inhabiting chiefly the country away on the left bank, where they live in small communities, scattering their huts among their crops as a protection against surprise. They are a timid people, but good and industrious farmers, growing chiefly millet and ground nuts; and, what is rare, both men and women work. They may be observed in the fields together, sowing their crops. After the ground has been cleared, the man walks along making a dab in the soil at intervals with his native hoe, and the woman follows with the seed, which she places in the hole and covers up with her foot.

Closely allied to these people, both in appearance and customs, are the Kabba-sara, who inhabit the vicinity of the river above Fort Archambault. Beyond the right bank to the east, the women of the Kabba-sara insert enormous wooden discs 4 inches in diameter in holes bored in the upper and lower lips, and the face is disfigured to such

an extent that it no longer looks human, and the power of speech is reduced to a mumbling. This hideous custom is said to have originated in the mutilations which the women inflicted on themselves to prevent being seized by the sultans of Bagirmi for their harems in the days of slavery. The raids of these Bagirmi sultans, followed by the devastations of Rabeh, have crippled and depopulated to a disastrous extent the whole of the Shari region. This great leader had no less than 60,000 men in the field, who devastated and fed on the land like locusts. Each division of this large army had its foraging-ground apportioned to it each day by the leader.

During our journey up the Shari the amount of game we met with was truly wonderful. On different occasions Gosling obtained elephant, giraffe, buffalo, rhino, hartebeest, bushbuck, duiker, water-buck, roan antelope, kob, ostrich, pig, and wild dog. This was accounted for by the fact that the dry season causes all this game to concentrate near the banks of the river.

At Archambault we found it necessary to collect a large supply of grain, for hardly a village lay in front of us, and our next object was the exploration of the Bamingi river, which flows through a deserted country. On August 6 we camped on a sandbank at the junction of the Bamingi and Gribingi rivers. The former is the larger, having a width of some 50 yards at its mouth. This river was still unknown to the explorer, unless we consider the record of a French trader, named Béhagle, who attempted to ascend it, but at the rapids about 4 miles from the mouth had his boat badly smashed and was compelled to return. He was afterwards hanged by Rabeh at Dikoa. With the exception of these rapids, caused by a reef of rocks across the river, we found the Bamingi excellent for navigation. In August it was at its full, with a depth of 6 to 9 feet and a strong current, which made our progress slow. The river has pretty scenery; the straight reaches are lined with trees overhanging the water's edge, and where the river takes a turn the impinging bank becomes high and steep, and the red colour of the soil lends a pleasing contrast to the green foliage. Sometimes these banks rise to a height of 60 feet formed by rocky knolls, and at these points the growth becomes tropical, with fine-grown trees. For 130 miles, the distance we travelled up this river, we found the country uninhabited, and the impressive solitude was only disturbed by the herds of elephants, which at times frequented the gravelly sandbanks, and troops of baboons that followed us along the banks, gazing in excited wonder at our boats.

On August 26, after a trip of three weeks, we found ourselves again at the mouth of the Bamingi. From here we eventually gained the Ubanghi by ascending the small rivers Gribingi and Nunna and descending the Tomi. Between the Nunna and Tomi a trek of four days with the boat sections across the low Shari-Ubanghi watershed

was necessary. This region is undulating and well watered, and the character of the vegetation changes. Thick belts of forest full of rubber vine hide the streams, and the fauna for the first time belongs to the forest region. The journey from the Shari to the Ubanghi was made under considerable difficulties, from the rains and floods.

The Shari-Ubanghi region is inhabited by an extraordinary number of peoples made up of the Wujia, Munjia, N'Dikongo, and Langassi, all sections or groups of the Banda race, who appear to have been driven down from the north-east by the raids of the Bagirmi sultans, and wars of Rabeh. They are inveterate cannibals, and their religion is Ju-ju. Each village is independent and ruled by a chief, who is the strongest and most unscrupulous man of the community. With the N'Dikongo, when a chief dies a general uproar is made, and all his wives are killed and buried with him. In the case of a headman, his body is buried upon a living bier of half the number of his wives, to the accompaniment of music and dancing.

In this part of the country the natives have a barbarously cruel method of hunting elephants. When a herd is located in the dry grass, all the villages turn out with guns and spears and fire the grass all round the herd. The poor beasts make frantic attempts to break through the ring of fire, and are to be seen rushing madly to and fro in their agony, rooting up trees and throwing grass and earth over their scorched backs. In the Shari region the natives hunt the elephant on horseback with poisoned spears, which leave their heads buried in the animal, whose tracks are then followed, sometimes for two days, to the place where it finally succumbs to the poison.

On October 13, 1905, we arrived at the French post of Krebeje, on the Tomi river, where the boats were put together again; but before leaving, important zoological collections were made in the Kaga Jirri hills, lying some 20 miles to the west of Krebeje. The Tomi river flows through an open country. It is very sinuous, and the overhanging branches of trees make navigation difficult. A journey of four days down the Tomi brought us into the Ubanghi, or "drinker up of little rivers," as its name implies, a great stream some 1200 yards in width, swelling to a mile at the bends. Its banks are fringed with trees, with undulating grass beyond. On either side chains of gentle rounded hills about 150 feet in height, and devoid of trees save in the hollows and ravines, loop sometimes close to the river line and sometimes wind away to a distance of a day's journey. Above the junction of the river Kwango there are large wooded islands, some 3 miles long, inhabited by elephant, pig, and the small Congo buffalo. As one journeys on the aspect of the river changes, and its course winds past wooded headlands that form a succession of bays. At Mobbai the river appears to be a dividing-line between a sterile and fertile land. On the right bank treeless hills, on the left extensive tropical forests, wind the valleys,

which are the home of many elephants and buffalo, and sometimes the haunt of the okapi. From the Tomi to Yakoma there are only two serious rapids—those at Mobbai, and the more formidable Setema rapids, where the river is cut up by rocks and strong currents for 1000 yards.

As regards the inhabitants, space does not permit me to mention more than the Banziris and the Yakomas or Sungoes, whose language is used in the trade of all this part. They are fine races, especially the Yakomas, whose men are veritable giants, and the finest specimens I have seen anywhere in Africa. All along the river there are thickly populated villages, some over a mile in length, and the appearance of the people strikes one as being extremely healthy and prosperous. The Banziris, especially, are keen traders, but salt and small red beads were the only currency, and they would not look at our cloth, for which they had evidently not discovered a use, as their complete nudity showed. The women used the small red beads for stringing in their hair, so thickly that they gave the appearance of their wearing close-fitting red caps. Red seemed to be the fashionable colour with them that season, for their bodies were covered with a red dye painted over an under coating of mud. They are avaricious, and will sell their children for the smallest gold coin. The young girls of the Yakoma race deftly weave long plaited cords of black twine into their hair, which, falling over their shoulders to the ground, gives the appearance of their possessing luxuriant tresses. The ends are wound on a stick like a big ball of twine that weighs 10 lbs., and is carried under the arm, and on the head when at work. The ears of the men have the lobes slit and stretched round an enormous disc of wood $2\frac{1}{2}$ inches in diameter.

On January 1 we arrived at Yakoma, a large Belgian post at the mouth of the Welle, and the next day we left to ascend the river, whose course has a width of from 800 to 1000 yards, studded with rocks, and flowing through an ironstone country, where the natives work mines to a depth of 90 feet. A few days later, in a thick mist, we set out to pass the Voro rapids, about three days below Jabbir, the strongest and most dangerous on the Welle, stretching a distance of 3 miles and sometimes a mile wide, cut up by a maze of small rocky islands, covered with palm trees and tropical growth, between which the water rushes and tumbles headlong through narrow channels, with beautiful cascades falling down on either side. By means of our long boat chain and strenuous poling, we reached the head of the Voro rapids. Here the river is divided into three channels by rocks and islands. To the right a magnificent fall of water roared and swept over giant boulders, the foam flying many feet into the air; while below the swirl of the water made troughs 3 to 4 feet deep. The same to the left, leaving the centre passage, only a little less formidable, to be faced. With superhuman

struggles, the boats mounted and were driven beyond the rapids. The violent uses the boats had now been put to had caused splits to appear, and I was at a loss to find a wherewithal to mend them, till I luckily remembered having seen a native woman mending her pots with the wax of wild honey, and it struck me at the time as so interesting that I made a note of it. And now I tried it with unexpected success. Wooden wedges were driven into the cracks, and then sealed over with the melted wax. The restoration was complete, and Samson's proverb reversed, for out of sweetness came forth strength.

Time does not permit me to give more than a general idea of the character of the Welle. Except for good water between the Angba hill and Niangara, the entire course is cut up by rapids and hidden rocks. As far as Bambili the country on the left bank is clothed in tropical forest, and after that follows a region of grass. The river folk are the Bakango, a numerous people, whose conditions have greatly improved since the Belgian occupation, for its protection shields them from the raids of the fiercer forest tribes.

It was at Angu that we first heard rumours of the existence of the okapi in the neighbourhood, where in the forest, some three days to the south-east of that place, we spent three weeks endeavouring to obtain one. The okapi, or *n'dumba* as it is very widely known by the natives, is very locally found, and Angu is the only part near the Welle where it is met with. We found its haunts were small streams running through swampy ground, thickly overgrown with a clean-stemmed plant, some 6 to 8 feet in height, with large oval shiny leaves bunching at the top, the young shoots of which are an essential food of the okapi. In these localities it roams about singly or in pairs, and, according to the native hunters, three may occasionally be found together. Gosling, although he got to close quarters with it on three occasions, never saw it, so perfectly concealed was it among these leaves. He says, "During the night the okapi will wander along in the mud and water in search of the young shoots of this plant. Here he may be found feeding as late as 8 a.m., after which he retires to the seclusion of the forest, where he remains until dusk. In the glades and clearings I found his spoor on ground frequented by buffalo and water-buck, but this is unusual, for his companions in the forest are more often the elephant, the greater bush-buck, and the yellow-backed duiker." At this time José had been following a solitary animal for three successive mornings in the vicinity of a stream. He observed that, on leaving the water, the okapi always took the same course between two large trees about a hundred yards from the stream. So, with the help of natives, he dug a pit 4½ feet deep between the trees, and then carefully concealed it with branches and leaves. Very early next morning José again approached the stream, and heard the noise of the okapi rushing away. Soon there followed a loud thud, for the animal, taking its usual course,

had fallen into the pit, and was secured. Owing to the thick leaf and forest, its restless nature, and keen hearing, even the natives find it difficult to track, and are obliged to resort to the method of trapping it in pits. They regard the animal as a mysterious creature, and say that it is always moving and never lies down to sleep. José's observations bear this out, for on several occasions, when he heard it feeding, it simply paused to take a leaf here and there and then passed on again.

This portion of the journey was the most trying to the health of the party, the long stays in the hot steaming forest hunting the okapi, and the work on the Welle, which has an evil reputation for being the breeding-ground of bilious and blackwater fever, told severely upon our already weakened constitutions, and we were all attacked by fever. It was at Niangara that the expedition received its last great blow. Gosling was struck down with blackwater, whose deadly attack he laid himself at the mercy of by his refusal, almost to the last, to abandon his labours.

Leaving Niangara with a heavy heart, I further ascended the river and arrived at Dungu, which is situated at the junction of the Kibali and Dungu rivers, and a few days later I left to ascend the Kibali, which has never before been navigated. From Dungu, after 30 miles, the river takes a remarkable bend to the north, forming a loop, and the hitherto flat bush country becomes broken near the south bank by a semicircular group of igneous hills and kopjes, the chief of which is Mount Arama, about 500 feet in height, pepper-caster in shape, and bearing a striking resemblance to the Wase rock in Northern Nigeria. From thence, as one ascends the river, now 80 to 100 yards in width, towards Vankerckhovenville the country directly to the south and east is undulating, accentuated by wooded hill ranges running from west to east, that in places are cavernous and rugged. One of these, the Gaima range, runs parallel to and within 2 miles of the left bank. In this range there are seams of magnetic iron ore, and I observed there were many trees on the watershed that had been struck by lightning. The Momvu, who inhabit these hills, told me that when there were blacksmith's villages on their tops, many people every year were killed by lightning. At the foot of this range, a hut, during a terrific storm, was set on fire, and two of my men knocked down and stunned; and a few days later a heavy thunderstorm broke from the south-east, with hailstones as big as beans.

Between Dungu and Vankerckhovenville there are many rapids, and the navigation of the river was performed under very great difficulties. Our rate of going was often only a mile an hour. Before reaching the Arama hills the formidable Makassa and Bari rapids had to be overcome. The former, 400 yards in length, consist of a reef of rocks across the river, where the water pours down at a gradient of 1 in 2. Immediately below the reef the current is very strong, rushing

and bounding over hidden rocks, and broken like the waves of a choppy sea. One of the boats had a narrow escape of being sunk; the bow was twice below the level of the current, and the water poured in.

As might be expected in the vicinity of the Arama hills, the river again becomes bad, and is much cut up by small rapids with strong currents; then there is a navigable reach of 6 miles through an open country, up to the dangerous rapids of Mangadda, Tzara, and Biti—caused by the proximity of ironstone hills on the left bank, which are practically a continuation of the Arama hills, and form the outside edge of the mountainous country to the south. Beyond the Biti rapids there is a fine navigable reach for 14 miles, with a current of $1\frac{1}{4}$ mile an hour, up to the Andimanza and Kobi rapids in the vicinity of the Gaima range and the river; then does not improve until this range of some 4 miles in length is passed, where a navigable reach of 10 miles brings one into Vankerckhovenville. The Andimanza rapids, which stretch for a distance of 2 miles, present a scene of wild grandeur. The whole river here swells out to a width of 400 yards, and is broken up by small rocky islands covered with tropical growth. Through the narrow waterways the water foams and bounds over hidden rocks and others half submerged, while beautiful cascades, falling over reefs between the islands, pour their waters into the main channel, where series of chutes in successive terraces present a grave danger.

The banks of the Kibali are sparsely populated. As far as the Gaima range there are scattered Azandi and Bakango villages, and then the tribes of the Momvu and Mombuttu, still unconquered, are to be found in the hills beyond the south bank. They build their frail huts of mud on the great slabs of rock, frequently using the caverns themselves as dwelling-places and shelters in time of war, and wherever there is enough earth they grow their maize amongst the rocks. They use arrows, poisoned by a juice extracted from a plant called urri, with leaves much like those of a pineapple, which is found among the rocks of the hills. In these hills I was fortunate enough to obtain from the natives two ancient stone implements. These stones, which are beautifully made and polished, have a rounded cutting-edge and two regular convex faces, and in length are 2 to 8 inches. They bear no resemblance to any of the chipped stones of magnetic iron ore which are only found in some parts of the districts south of the Welle. The districts in which these stones have been found are bounded on the north by the Welle and Dungu, on the west by the frontier of the Ubanghi district, while in the east they have been discovered in the neighbourhood of Dufile and Wadelai. The tribes are ignorant of their origin, and believe they are bolts of lightning which strike trees and kill men. The Azandi call them "mangua n'gambi," or "axes of the lightning," and the Mangbettu "negbara gombe," meaning the same thing. They say that

these axes may often be discovered by turning up the soil immediately a tree has been struck by lightning; a little later it would be no good, because the stone would have gone back to the clouds in order to strike again! Many natives attribute a mysterious power to them, believing their discovery announces a friend's approaching death; and the Mangbettu cherish them as charms, every morning throwing upon them the water with which they rinse their mouths, in order, as they say, to avert trouble.

On July 21 I arrived at N'Soro, which is a small Belgian post with a white officer. We attempted the river Ira, or Bakwa, which up till now has been considered the main stream of the Kibali. But this is not the case, for the N'Soro, which falls into the Kibali some 2 miles below the post of that name, is really the main stream, and at the junction is some 200 yards wide. I found the Ira navigable for 12 miles, with an average width of 50 yards. At N'Soro it takes a sudden turn to the south, and flows through an open, uninhabited country of grass and bush. About 8 miles from the post it makes a remarkable loop to the north, following a chain of volcanic hills called Rangu-Rangu, some 600 feet in height, that run parallel to the right bank. They are inhabited by the Logos, or Bauu. They were given the latter name by the Belgian soldiers, mimicking the noise they made, which was like the howling of dogs, as they ran before the strangers. The natives have now adopted it themselves, and if you ask one the name of his tribe, he always replies "Bauu." The whole way we came upon numbers of elephants, which, so unaccustomed to man, allowed us to approach quite close, and it was a pretty sight to see them playing on the banks and bathing in the water.

Beyond the Rangu hills the river is unnavigable. We struggled for several days up many bad rapids, and eventually found ourselves in the hostile country of the Mombuttu. Their villages were deserted, and we could not get food, and, as the grass was too high for game-shooting, and our supplies nearly finished, we were forced to return and shoot the rapids behind us back to N'soro. Subsequently I penetrated by road into the country of the Mombuttu, south of the Ira. Here the scenery is grand. A mass of mountainous hills rolls away, range on range in glorious confusion, their steep sides darkened with trees, save where they are scarred by clefts and sharp angles of bare rock. And below in the deep valleys the courses of innumerable streams are revealed by their coverings of tropical green. From here, where I climbed to a height of 4000 feet, far away to the eastward on the horizon, I saw for the first time the grey blurr of the hills of the Nile.

On September 23 I again left N'Soro, carrying the boat, with the idea of getting to Faraggi and ascending the Dungu, which the natives told me was the same as the Kibbi, rising in the neighbourhood of Mount Schweinfurth. Two miles to the north of the post the river

N'Soro had to be crossed. It is 120 yards at this point, is unnavigable both above and below, and runs through the country of the Logo, who, with the exception of two of the large chiefs, have not yet submitted to the white man. They are a big tribe, ruled by a nobility, called the Gambi. They are a filthy dirty people, and have some strange fashions. The women plaster their hair with a red mud, and wear a ring in the upper lip like a pig, and a long bone spike in the lower lip, and the lower front teeth are taken out.

I got to Faraggi, and from there tried to ascend the Dungu, but found it quite impossible, so trekked across the country two days' journey, and gained the main road to Yei, a distance in all of eight days from N'Soro. The rise along this road was so gradual that we were greatly surprised, when near Aba, suddenly to behold the huge panorama of the Congo-Nile watershed. Behind us to the south lay the dark green vastness of the Congo forests, whose monotony was here and there relieved by winding partings in its surface that told the courses of rivers. On either side and to the north stretched endless plain with an occasional lonely hill, and far away to the east the sharp peaks of a sierra chain.

On October 13 I arrived at the Yei, and having formed a column to carry my collections to Gondokoro, to ensure their safety as well as our own by lightening the boat, we commenced the descent of the river. At this point the river is little more than a rocky mountain stream, 25 yards wide, and some 30 miles from its source in the Lugware district. For the first 20 miles we passed a succession of rapids in terrace formation, rendered more difficult by the obstruction of small green islands. It was laborious progress, sometimes only a mile a day was made, and the boat had to be got past the rapids by the men hanging on to the chain in the water from the stern. Sometimes trees, fallen right across the stream, had to be cut through. At other times, where a passage allowed, we took the risk and shot the rapids. The boat was now in such a battered condition that frequently after the passing of a rapid it had to be drawn out of the water, a fire lit, and the wax melted, and the wedges renewed. After this difficult 20 miles, the river decidedly improved, with steep-cut banks of soft loam, and after a good navigable reach of 15 miles we came to the Azandi village of Kapi, which was the first populated part we had met with. Here many of the natives bear the slave-marks of the Dervish chief Otrusi—three deep diagonal incisions on each cheek. It was at this place I saw the interesting ceremony of the signing of a treaty between the chief and an ancient foe. They met, each surrounded by his followers, and their headman made incisions in the chiefs' arms, and with a feather mingled the blood of one with the other.

From Kapi for 23 miles the river is good, with the exception of two rapids, the second of which was one of the worst, and certainly the

most disastrous, we had to encounter. Owing to the tremendous current, the men on the chain behind for a moment relaxed, and the boat was driven with terrific force against an overhanging tree. The shock swept off two of the polers, who disappeared into the torrent never to be seen again. José was also thrown into the water, but, being a strong swimmer, gained the bank, while I found myself hanging on to a branch of the tree. The boat was sunk, and only recovered with great difficulty and the extra help of natives the next day. The rudder, however, was lost, and the rest of the journey had to be accomplished without one. In the open reaches of this part of the river we came across numbers of hippos, and their closely cropped feeding-grounds by the riverside afforded us excellent sites for our camps. They were not always successful in getting out of our way in time. On one occasion, as the boat was coming down at a rapid pace into a pool, we were all thrown together by a tremendous bump, and for a moment all thought we had struck upon a rock. But the rock snorted and plunged out of our way.

For the next 6 miles, up to the station of Wandi, the river is quite unnavigable. In places the boat had to be unloaded and dragged over the rocks, so as to avoid the chutes, that were gigantic. The river in appearance ceases to exist, and the water pours itself as best it may over the slabs of rock with which the whole length and breadth are strewn. In this distance there are at least six big rapids, and the last, which is near the station of Wandi, is a veritable chute. At the one before this we had a very narrow escape of being smashed up. We had been going in smooth water for a time, and the men were all in the boat poling, when suddenly the current became strong, and the boat was carried helplessly along, each second nearing the steep of a formidable rapid. The poles were quite useless to check the impetus of the boat, which increased every moment. In spite of the heroic efforts of the men, the boat swung round, and the next instant crashed heavily against a large dead limb of a tree, where it stuck. But for this there would have been nothing to hope for.

It was dusk, and a heavy storm was raging when we arrived at Wandi, dead tired, for it had been a long day of hard conflict with the rocks. Wandi was formerly occupied by the Dervishes, and traces of them are still to be seen in the fine lime trees, now in full bearing, which grow on the sites where their houses once stood. Also there are large numbers of elephant-tusks to be found in the bushes, which the Dervishes left behind in their hurried evacuation of the country, and many of the present people, who are much split up, bear the slave-marks of the powerful Dervish, Otrusi. The tsetse fly, the species that carries the germ of sleeping-sickness, was very much in evidence here, and I saw two cases of the disease. Further on it became still worse, and close to Avurra, which is on the borders of the Bahr el Ghazal

province, I came across two villages that were wiped out by the scourge, and the chief of another was brought to me in a dying condition.

At Wandi the waters of the Yei are swelled by the Tori river, some 30 yards wide at the mouth. For 100 miles after leaving Wandi, to within 40 miles of Avurra, the river flows through a country of poor stony soil and is at its worst; nothing but rapids the whole way, and the one 6 miles from Wandi is the biggest we had yet seen, and presented a splendid spectacle. Here the river is 300 yards across, and a great volume of water sweeps foaming over steep rocks past islands covered with beautiful palm trees, which are the resorts of dog-faced baboons. In the neighbourhood of Raffai appear small hills of not more that 400 feet. These are inhabited by the Misa people, a tribe that struck me as rather original. The men, who are smooth-skinned and gentle, adorn themselves with bead ornaments and girdles of beautiful design, while the women affect a masculine severity of costume, fruit-stones taking the place of beads. At Avurra the Yei becomes a splendid river with a sandy bottom, clean banks, and an average width of 60 yards, and the country throughout is well populated.

It was now December, and the river was rapidly emptying itself; in places there was hardly enough depth to clear the keel of the boat, and it became a race between us and the water. To hasten our pace we threw away all our belongings with a light heart, for our spirits were high, as we had said farewell to the rocks. For about 90 miles to near its mouth the Yei flows through a flat country, well wooded with mimosa, broken sometimes by open grass stretches where large herds of cattle and sheep roam at will. Often along the sloping banks one sees the brilliant green of young tobacco plantations. This is the land of the Dinkas, who on our first appearance ran away, but later, gaining confidence, flocked down to the river and lined the banks in hundreds. All naked and with their bodies painted a ghastly white, they shouted and danced and threw their long spears into the air. So we made 60 miles, then trees, flocks, and men gradually disappeared, and the river wound alone through a vast empty plain. It widened and slackened, and the impression came over me that it was nearing its journey's end. Eagerly we craned our necks for a sight of the Nile, but this reward was still withheld; nothing but marshland as far as the horizon met our gaze. Then the river, which at this point is known as the Lau, broke into two deep and narrow channels, of which only the right held water at this time with a fairly strong current. Between the channels lay a stretch of marsh that broadened to the width of a mile. All round, the land is so low that during the rains it becomes a vast marsh. We followed the channel for some 30 miles, and then the river lost itself in a lake with an area of 4 square miles, surrounded by dense reed and sudd. We crossed the lake with irresistible recollections of Chad, and picked up the

thread of the stream again on the further side. This ran on for another 3 miles, and finally disappeared into the barrier of marsh and sudd which choked our passage to the Nile. It was impossible to cut through, and so I trekked with the boat sections to Ghaba Shambi on the Nile, a distance of 40 miles. I have calculated that my passage of the Yei, by showing it navigable in its lower reaches, proves that it could be utilized to lessen the transport by six days of the food supplies to our garrisons in the Bahr el Ghazal province from Khartum, on which they are entirely dependent. Also it is my opinion that, if the barrier of sudd were cut through, the increase of water to the Nile would immensely improve the irrigation of the Sudan and Egypt; so too with the river Naam or Rohl, which flows more or less parallel to the Yei.

On my arrival at the Nile, I took boat to Khartum, where I paid off the surviving boys, who nearly all joined the pilgrims to Mecca. And so, with our arrival on the Nile, the goal we had set ourselves was reached, and our journey brought to an end, which in distance had extended over some 5000 miles and in time occupied just three years. And my greatest hope now is that its scientific record may in some measure repay the price that was spent upon its achievement, for the expedition paid a heavy toll in valuable lives. And when I think how its success was based on the efforts and crowned by the devotion of my lost companions, and when I realize your kindness in listening to me to-night, I feel it is very difficult for me to speak, remembering the voices that are still.

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Before the paper, the PRESIDENT read a letter which H.R.H. the Duke of Connaught had sent through his controller of the household, expressing his regret at being unable to be present, and congratulating Mr. Alexander on his safe return. He then continued: I think, on seeing this audience, that there is no question that Lieut. Boyd Alexander, of the Rifle Brigade, will have a very warm reception. He thoroughly deserves it, for the work he has done has been of a specially notable nature. No doubt the mere crossing of Africa in its breadth between the Gulf of Guinea and the Mediterranean, or the Red sea, or the Indian ocean, is a much less formidable task now than it was in the days of the early pioneers of the nineteenth century, because the partition of Africa from 1884 to 1900, and the gradual spread of effective occupation, have facilitated the mere traversing of Africa from sea to sea. But this was not the character of the Alexander-Gosling expedition; they did not seek, as the early explorers were compelled to seek, the most practicable and quickest routes. On the contrary, like good geographers, they sought out the least known districts; they followed the lines which would enable them to give us the fullest and most complete information on regions hitherto unexplored, and they were three years in completing their work, with the result that they have brought home a mass of information of various kinds, and, as you will see from the maps that have been distributed amongst you, they have explored regions some of which were only partially known, and some of which were absolutely unknown. We lament the price that has to be paid for this devotion to their work, and we deeply sympathize with the relatives and friends who mourn the loss of those whose capacity, whose energy, and whose courage they were justly proud of. I shall not

dwell upon this point, which must be painful to many in this hall; but it would not have been fitting that the Royal Geographical Society, in giving a welcome to the expedition on its return, should have omitted to make any reference whatever to the death of those two most distinguished officers, Captain Gosling of the Rifle Brigade, and Captain Claud Alexander of the Scots Guards. The only surviving Englishman of the expedition who reached the Nile was Mr. Boyd Alexander. You will have heard from us at previous meetings last year, and you will have seen in our *Journal*, the excellent work done in the early part of the expedition in making a survey from Ibi, on the river Benue, to Lake Chad. You will hear from Mr. Boyd Alexander himself such a summary as the limits of our time permit of the whole expedition from Ibi to the Nile, and although Mr. Boyd Alexander has not dwelt at all on personal questions, you will, I am sure, gather from the bare facts he puts before you the extraordinary personal qualities that have been displayed by all concerned, and which are worthy of the high commendation of their countrymen. I will now ask him to give us his paper.

After the paper, Sir HARRY JOHNSTON: I did not know that I was to speak here to-night. I was a listener and an admirer of Lieut. Boyd Alexander, whose paper, I think you will agree with me, is one of the most remarkable that has ever been read in this theatre. The three years' journey has been performed under circumstances of difficulty and sorrow, in the death of those to whom he has alluded; but I feel sure that the ultimate results of this great expedition in scientific information will, as the lecturer half hopes, have even repaid the price that it cost. I think that the Alexander-Gosling exploration of Lake Chad was not only remarkable geographically, but was particularly interesting as evidencing the western extension of the Nilotic influence. From the photographs, I was struck with the similarity between the Buduma and other Chad peoples and the Nile negroes in physical features; and in making some researches into the Nilotic languages, I find from the vocabularies of Barth, Schweinfurth, and other travellers that the influence of the Nilotic type of speech can be traced as far west as the Shari river. Another link is the long-horned breed of domestic cattle, which extends from the White Nile and Abyssinia to Uganda and Tanganyika, and also, as we now see, to Lake Chad and the Central Niger—perhaps even to Senegambia. I have only one word to add about the name "okapi." I have been told that the name I conferred on this creature is called in question as simply meaning in one language "a big beast," and being disowned by other tribes. I can only say I subjected the natives to a great deal of cross-examination, and I never got any other name but "okapi" or some word closely resembling it. The word "okapi" actually comes from the Momvu people and the Ituri pygmies. But a creature like that has probably twenty or thirty different names amongst the different tribes, because the many tribes of the north-east Congo forest speak languages differing radically the one from the other.

Sir RAY LANKESTER: I have had the very greatest pleasure in being present this evening and hearing the wonderful narrative of my friend, Lieut. Boyd Alexander. It is, I think, about a year or possibly little more than a year ago that news travelled through—I do not know how—to the effect that his party had captured a live Okapi, and then came the news that they had got its skin and were bringing it home; and at last, three months ago, Lieut. Boyd Alexander arrived in England with his Okapi, and he was kind enough in a very short time to bring it to the Natural History Museum. It is a very beautiful skin, and it comes from a point in Africa which is about 250 miles to the north-west of the region from which our previous specimens, without definite location, of the Okapi had been brought to notice. This probably is the extreme western and northern range of

the Okapi, and the specimen differs at first sight from that which was brought by Sir Harry Johnston from the Semliki river, being of a very much darker colour and with stripes more numerous, and of creamy white rather than a pure white. There are also certain features about the skull and about the tufts of hair at the tail in which it differs from that first specimen. But perhaps I may be allowed for a moment to digress on the subject of the Okapi. Nearly every specimen of Okapi which comes home differs very greatly from every other specimen. It is one of the most variable animals which has come under my observation, and whether I shall ultimately be able to name this Okapi after Lieut. Boyd Alexander, which would give me the very greatest pleasure, I do not know. I am examining, as far as I can, all the skins of the Okapi which have been brought to Europe, and all the skulls—I suppose at least twenty skins or skulls have come through, and I have knowledge of some twelve to fourteen specimens—and eventually I hope to be able to say something definite on the subject. I think it is a wonderful thing that news should have come out of the centre of Africa about the capture of this specimen. After tremendous struggles Lieut. Alexander had to get home; he had to throw away nearly everything, but the Okapi skin he did stick to, and some other specimens. I wish he had been able to bring his boat here, and I wish the Okapi had been set up in time for this present meeting. I hope I shall see him with it in the Natural History Museum at no distant time. Amongst other things which he brought home there were nearly one hundred different species or interesting forms of mammals, of which my assistants in the museum tell me at least eighteen are new species, and some have been described already. There are some very remarkable rat-like forms, and there is a very interesting small antelope which has been named after Lieut. Alexander's brother, and there are other things. He himself is working at the birds he brought back. To-night we have only had the itinerary, the remarkably personal account of his adventures, which impressed me very much. Of course, there is all the collecting which went on, and the scientific observations, which, no doubt, will first of all come to us in the form of separate papers, but will afterwards be embodied in Lieut. Alexander's book. I can only say that to me it is a very great pleasure to be here, and a very great pleasure to have made the friendship of so remarkable and worthy and heroic a traveller as Lieut. Boyd Alexander.

Dr. Bowdler Sharpe: At this late hour of the evening I can only offer just a few remarks which may, perhaps, add a little to your knowledge of what my good friend Lieut. Boyd Alexander has done. I may tell you that I have known him, I may say, from a boy, and have esteemed him always as a brave traveller and splendid naturalist. I am naturally very proud to be present here to-night, and see such a large body of his friends come to welcome him after his wonderful journey. I have ventured, and so far it has been a successful venture, to divide Africa into zoological regions, one of which is the forest region of Western Africa, which comes down to the Coanza or Quanza river, and then follows the Congo system right up to the Nile watershed. That is the land of the gorilla and the okapi. We know a good deal about the Algerian Sahara and Tunis, but nothing about Lake Chad, and until Lieut. Alexander went into the country, I should not be wrong, I think, if I say we had three specimens of birds on which alone we could give a guess as to the fauna of the lake. Hitherto it has been all guesswork, but I have said for thirty years that the fauna of Senegal would be found to extend throughout the Sudan to Abyssinia, and that it was entirely different from the fauna of the West African forest region. Now that Lieut. Alexander has gone up to Lake Chad and has made a beautiful collection of birds, as you will see from the specimens in the next room, he has proved that the fauna is continuous, as I thought

it would be. Of course, it is a little disappointing from the point of view of new species, but I never expected many; and I can only say, and I am sure he agrees with me, that as every fact he has discovered is perfectly new, and a gain to science, so not a bit of his work has been lost.

Sir JAMES WILLCOCKS: When Sir George Goldie told me he was going to ask me to say a few words, I must own I was somewhat alarmed; but I remembered it was regarding my friend, Lieut. Alexander, who has done such good work, and to whom I owe a debt of gratitude. As I served for two years in the Niger, I think I understand more perhaps than many of those here the immense difficulties Lieut. Alexander must have gone through—sickness, want of food, deserts, swamps—and yet he has triumphed and looks well after it. The country east of Lake Chad, when I was in Nigeria, was looked upon as a land that would never be seen in our days. Lieut. Alexander has proved to the contrary. I remember in Ashanti he was always trying to find something new, birds or beasts, or some parts of the country which the rest of us could not get to, and he has now found something that other people have not been able to find. So long as England can produce such sons and our army such officers, I do not think there is any fear of England losing its first place as a discovering nation, and a nation that helps to civilize unknown lands.

The PRESIDENT: It only remains for us to give a hearty vote of thanks to the reader of the paper.

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## A JOURNEY FROM YÜN-NAN TO ASSAM.*

By E. C. YOUNG.

THE idea of investigating the country which lies between the empires of India and China south of the Tibetan frontier is one which has long had a special attraction for geographers and travellers, both on account of the possibility of opening up a trade route between the two countries, and more especially because of the comparatively unknown nature of the intervening district; and it is with the object of communicating some information collected by the writer during a recent journey from Yün-nan to Assam that this paper has been written.

It was in the autumn of last year (1905) that, being fortunate enough to obtain leave for six months, I decided to carry into execution a long-cherished design of undertaking the journey I am about to describe. I decided, firstly, to take only two companions, Chinese servants of mine, who had been in my employ for some years, and upon whom I knew I could thoroughly rely; and, secondly, to live almost entirely on the produce of the country I was to travel through, taking only a small reserve of tinned stores for use in emergencies. The two servants were natives of Chih-li province, and it is not too much to say that but for their fidelity and pluck the journey could not have been accomplished. Our equipment and stores, etc., were limited to some five hundredweight of baggage, including a fairly complete outfit

* Map, p. 236.

of surveying instruments, and, thanks to the care with which this kit had been selected, it proved almost perfect in every respect.

On October 1, 1905, we set out from Tientsin (North China), and after travelling by sea to Haifong, passed through Tongking by rail and steamer as far as Lao-kai, on the southern frontier of Yün-nan, from which place till we reached India some five months later the whole of the journey was accomplished on foot.

Leaving Lao-kai on October 24, we travelled through the picturesque and mountainous basin of the river Nan-hsi, following the line of the new French railway as far as the treaty port of Mêng-tzŭ Hsien, from which place survey operations were commenced. We left Mêng-tzŭ Hsien on November 1, and travelled through Lin-an Fu to Shih-p'ing Chou, passing through an undulating country with low rounded hills, which are covered with long grass and sprinkled with saplings and small trees, and with innumerable limestone boulders, whilst the valleys are populous and cultivated. The villages are solidly built, the houses being chiefly of a sort of rough concrete of earth and pebbles, rammed tightly so as to form solid walls about 2 feet thick. From Shih-p'ing Chou we turned northwards, and, after a march of about 20 miles, ascended a steep pine-clad ridge, at the top of which we found ourselves in a rolling upland country some 6000 feet above sea-level, partially cultivated, and with numerous pine woods and occasional villages. Here we encountered a distinct type of native belonging to the aboriginal tribe of I-jên. They speak a language of their own as well as Chinese, and are a peaceful and well-behaved people hereabouts, and subject to the Chinese Government. The men differ but little from Chinese in appearance, but their features are heavier and less intelligent. The women, however, are pleasant-looking people, with aquiline features, and their free independent bearing is in striking contrast with the timid manners and hobbling gait of the Chinese lady. They wear a spotted blue cloth over the head, and have petticoats of dark-blue cotton; they also wear many silver ornaments, large earrings, and necklaces, etc. Leaving the I-jên villages, our route continued northwards through a hilly wooded country, with numerous pine trees as well as crab apple, wild pear, hips and haws, and berries of different sorts. Passing through the walled city of Hsin-hsing Chou, which lies in a broad cultivated valley, we reached the village of Hsin-kai, from which point we turned to the westward.

The trend of the mountain system of this part of Yün-nan is, generally speaking, north and south, so that the traveller whose course is in an east-and-west direction runs counter to the ranges, and experiences a continual series of ups and downs, as when crossing the ridge and furrow of a ploughed field. From Hsin-kai we traversed a comparatively little-used path through a picturesque woodland district, till, after passing a village called Yang-hsing-chuang, we ascended

what appeared to be quite a low range of hills, and were surprised to find, on reaching the crest, that we were looking down over a great expanse of steep mountain-side which was chiefly covered in brushwood. Far below there was a long cultivated valley running north and south, in which lay the town of Yi-mên Hsien, on the further side of which a lofty range of mountains blocked the horizon to westwards. It was our first ridge and furrow.

We made a day's halt at Yi-mên Hsien, a small walled town of about 2000 inhabitants, and then tackled the next ridge which lay to westward. On leaving Yi-mên Hsien the road ascends almost immediately, and within a few miles climbs by a series of ridges to a height of some 7800 feet. From this height a fine panorama of mountain scenery was obtained. The mountains are flat topped, and the slopes are sufficiently gentle to admit of cultivation, and they presented a patchwork of fields which bore evidence of an industrious population. A few miles along the mountain-tops brought us to the edge of a gloomy rugged ravine between steep and lofty hills, at the foot of which a turbid stream of dark brown water tore its way down a shaly slope at an inclination of about 15 degrees towards San-chia-ch'ang, a small village of flat-topped, brown-walled houses, nestling at the foot of a beetling cliff. Here we saw copper smelting works of a primitive type, and the horizontal burrows into the side of the cliff from which the ore is extracted. Beyond San-chia-ch'ang we encountered a series of steep and often lofty hills, over which the path ascended and descended with monotonous regularity. The path was practically deserted, and the few people we saw appeared sickly and poverty stricken. Many of them were stunted and deformed, and we saw numerous cases of goitre and enlarged spleen, as well as what appeared to be "berri-berri." In this rugged country cultivation was scantier and was chiefly confined to the valleys, the hills being either pine clad or covered with coarse grass. It was the end of the harvest season, and threshing was going on. Sometimes this is done with flails, and sometimes by striking the paddy over the edge of a large circular saucer-shaped basket, so that the grain falls into the basket while the straw remains in the thresher's hands.

As we journeyed west the mountains increased in height, cultivation was less frequent, and the country more thickly wooded, until we reached Nan-an Chou, from which point, turning northwards again, we passed through a few miles of undulating pine-clad uplands, descending into the valley of C'hu-hsiung Fu, where we halted.

The route from C'hu-hsiung Fu to Ta-li Fu is so well known that I need not attempt any description of it here. The road was good—as Chinese roads go—the weather perfect, and the scenery picturesque and striking, and we enjoyed a rapid and interesting march of six days between the two towns, arriving at Ta-li Fu on November 25. At Ta-li Fu we halted for a week, in order to make our final preparations

for the advance into the unknown regions of the Salwin river. Mules were now discarded, and loads were made up suitably for coolie transport; dollars, which had hitherto been our currency, were now melted down and turned into the small conical lumps of silver which are known as "sycee;" fur clothing was purchased, and also a supply of local provisions—hams, tea, sugar, etc.—which, together with our tinned European stores, were estimated to last us for about a month. Whilst at Ta-li Fu I received a letter from the British consul at T'êng-yüeh T'ing, the late Mr. Litton, warning me of the disturbed state of the tribes on the upper Mekong and in the neighbourhood of Wei-hsi T'ing, where a Tibetan raid had recently taken place, during which four

VALLEY OF THE MEKONG, LOOKING SOUTH FROM NEAR FEI-LUNG-CHIRO. TERRACED RICE-FIELDS IN FOREGROUND.

French priests had been murdered, and the mission stations destroyed, whilst the repressive measures of the Chinese authorities had only served to aggravate the state of affairs.

We left Ta-li Fu on December 3, and proceeded northwards over a stone-paved road along the west side of the Erh Hai to Shang-kuan—the upper customs barrier on the approaches to Ta-li Fu—and then on to Têng-ch'uan Chou, which lies at the head of the lake. From Têng-ch'uan Chou we turned west, and ascended a pass in the lofty range of mountains at the foot of which Ta-li Fu lies. From the top of the pass we looked down into a long slanting valley, with the town of Fêng-yü below us. The hillside was so steep that the

valley appeared as though seen from a balloon. It was closely cultivated, and the little banks which edge the fields and serve to regulate the irrigation water looked like the squares of a chessboard. A stream wound in a silver streak from south to north, peasants were working in the fields, and numerous villages were visible; but the height from which we viewed it precluded the sounds of rural life, and the scene was a silent one. Descending into the valley, we rested at Fêng-yü, and from there ascended the Lo-pin Shan, a mountain of 10,100 feet, whose summit is said to be the abode of evil spirits, who, however, have a virtuous objection to bad language and noise, so that travellers must be careful what they say when crossing the pass, lest the spirits should send fogs or storms or other visitations to punish them! A similar belief is common in other parts of Yün-nan, and I shall have to record the existence of kindred superstitions which we observed at a later stage of the journey.

From the summit of the Lo-pin Shan, looking westwards, we saw ranges of thickly wooded mountains running north and south stretching to the horizon, but were relieved at the absence of any snow-clad heights in front of us, though behind us, to eastwards, the summit of the Tal-li Fu range was powdered with snow, whilst to north some glittering snow-clad peaks near Li-chiang Fu were plainly visible. Descending the pass, we now followed the course of a tributary of the Yang-pi Ho, and entered a thickly wooded but sparsely populated country, where for two days we marched through beautiful autumn-tinted forests of oak and walnut and fir trees. Occasionally we met caravans of mules and bullocks carrying firewood or salt, the latter commodity being in small cylindrical cakes about the size and shape of a pint-pot, but with Chinese characters moulded on the top. The foot-passengers we encountered were said to be Lolos, and were almost always goitrous and dirty. Generally they wore a skin over their shoulders, with the fur outside, and their legs were encased in ragged knickers or drawers, with cotton putties wound loosely round the lower part of the leg. Their unkempt locks were bundled away under a scanty turban or puggri. The women we passed were dressed so much like the men that we had difficulty in distinguishing them, except by the jade earrings they wore, and by the fact that they were cleaner and of more pleasant features than the men. The few houses we saw were log cabins built of unshaped pine logs, and roofed either with pine shingles or thatch. As we continued our way westward the average height of the mountains increased, though the Lo-Pin Shan was still the highest point we had crossed. We reached Yüng-lung Chou on December 9, and after a day's halt proceeded to Fei-lung-ch'iao, on the Mekong, from which point survey operations, which had been discontinued since Ch'u-hsiung Fu, were recommenced.

At Fei-lung-ch'iao I was, unfortunately, not able to take a cross-

section of the Mekong, but I observed that it was 235 feet wide at the bridge, and a sounding taken from the bridge in mid-stream gave 25 feet as the depth at that point. The water was clear and of blueish-grey colour; the current was strong, and rocks and rapids above and below the bridge rendered navigation impracticable. The famous suspension bridge is a single span bridge of 235 feet clear span, with a plank roadway 8 feet 3 inches wide, supported by twelve chains of 1-inch iron. Two similar chains form the top of the handrails, which are of wood. The chains are in groups of three, there being three double chains on each side. The height of the roadway above the water-level at that time was 44 feet at either end, and 37 feet in the centre.

RIVER SALWIN ABOVE LU-KU, LOOKING DOWNSTREAM SOUTHWARDS. BAMBOO RAFT FERRY IN THE FOREGROUND.

From Fei-lung-ch'iao we ascended the right bank of the Mekong for a few miles, and then ascended the lofty range which divides it from the Salwin, which at this point is a continuous barrier rising to a height of well over 10,000 feet; its slopes are steep, but not precipitous, and are covered with pine woods. On reaching the summit of the pass we found a small post of three Chinese soldiers, from whom we learnt that the pass is open practically all the year round, as there is never very heavy snow on it. The midday temperature at that date (December 12) was 39° Fahr., and a high wind was blowing from the west. This is the pass by which Prince Henry of Orleans crossed in 1895. On the eastern side of the range the slope up from the Mekong

is a direct one, the river flowing past the foot of the main range; to westward, however, one looks out over an expanse of partially wooded mountains, the general trend of which is north and south, though at this point a stream flowing in a narrow valley cuts its way through them at right angles. The Salwin is not visible at this point, and indeed is three marches distant. The route passes through this valley, and we followed it to Lu-kou, on the left bank of the Salwin. The population of the Salwin valley in this neighbourhood is chiefly Liso, but there are also a few Minchias and Lolos near Lu-kou, as well as some Chinese or Han-jên. These different races are under t'ussu government as far north as Hsia-ku-ti (lat. 26° 16′), beyond which place there are independent tribes, possibly of Tibetan origin, who refuse allegiance to any government; these I shall have to deal with later.

The t'ussu or chiefs are of Chinese birth, and the office is an hereditary one, having originally been conferred on the family by the Chinese Government for services rendered in war time. The t'ussu rule is patriarchal, and considerable latitude is allowed them; but that the Chinese authorities retain a strong hold over the chiefs is evidenced by the fact that at the time we were at Lu-kou, the t'ussu of that place was absent in gaol, where he was just completing a term of ten years' imprisonment, which had been imposed on him by the Chinese Government for having taken the life of one of his own subjects with his own hand. A young relative was in charge of the yamen at the time; but the convict chief was released shortly afterwards, and received a hearty welcome home from the members of the clan.

The Liso, who are the predominant race hereabouts, have a distinct language, which, as far as I could discover, is not written. They are of slight build, with light-brown skin and aquiline features resembling the Red Indian type. Some of the younger men and women are distinctly pleasant featured, and are often graceful in figure and carriage. The men wear a short coat and loose knickers of blue cotton, and short loose putties which are wound round the lower part of the calf and ankle; instead of putties, gaiters of coarse hempen cloth are often worn. The men shave their foreheads at long intervals, and wear a short, unkempt pigtail, which is usually tucked up under the small puggri which both sexes wear. Every man and boy is armed, and they rarely travel beyond the limits of their villages without weapons. These are a crossbow, with which poisoned arrows are used; a long, straight, two-edged sword; and usually a small dagger or clasp-knife. The women wear a long tunic and trousers of blue cotton, with often a broad horizontal band of red, white, and black round the sleeve at the elbow. They also affect many ornaments of silver or beads and shells, such as earrings and necklaces; wealthy men also often wear a large silver earring in one ear.

Their houses are built of wood, and are either thatched with grass or pine shingles, or else roofed with large flexible mats of split bamboo, which are 6 or 7 feet wide, and long enough to reach from the eaves on one side to those on the other, so that two or three are sufficient to roof the whole house. The floor is of planks roughly shaped with an axe, and is raised some 4 to 5 feet above the ground on posts, the space underneath being fenced in and used as a cattle-shed or pig-stye. In this mountainous region villages are often built on a steep slope, the space under the floor then being triangular in section, one edge of the floor almost touching the ground, whilst the other is 5 or 6 feet

LISSU VILLAGE OF TSA-MI-TI, IN THE SALWIN BASIN. THE SCAFFOLD-LIKE ERECTION NEAR THE HOUSE IN THE FOREGROUND IS A FRAME FOR DRYING TOBACCO LEAVES. CULTIVATED FIELDS SURROUND THE HOUSES.

above it. In the centre of the floor there is a square hearth of mud, plaster, or stone let into a wooden frame, and on this the fire is kindled, the smoke finding its way out as best it may. The walls are of pine logs or else of bamboo matting, there are no windows, and the door is a rough construction of planks tied on with cane. No metal is used in the construction of the houses. The furniture consists of a few wooden blocks, or sometimes bamboo stools, for squatting on round the fire; a bed made of loose planks supported by a couple of logs; and occasionally a few roughly made cabinets or boxes entirely of wood, in which food is stored. Their utensils are an iron bowl or copper pot—the latter imported from T'êng-yüeh-ting and Yung-ch'ang Fu—and an iron tripod.

Pitchers of bamboo are used for drawing water and for storing honey and rice, etc. The Lisos are hunters, but the country has been largely denuded of game, and they live chiefly by agriculture. They have cows and pigs and goats, and, very rarely, a few ponies are also to be seen. In character the Lisos are reported to be fierce and warlike, but though this is true when they are in their own territory and in strong numbers, my experience is that they are timid and nervous among strange surroundings, and lacking in what we call pluck. On the other hand, they are courteous and hospitable, and have something of the Chinese respect for rank and authority.

During our passage through the Liso country, we noticed a considerable trade in a species of herb, called Lu-tze by the natives, which grows in the patches of jungle found low down in the valleys. The plant is a creeper, and grows on the trunks of large trees much like ivy does; its stem is thick and strong, and its leaves, which grow thickly all the way up the stem, are pear-shaped, and resemble the leaf which the natives of India use for wrapping betel-nut in (called "pan"). It has no fruit except a sort of bulbous pod, half berry and half leaf, which constitutes the valuable part of the plant. This usually grows high up on the trees, which the Lisos climb by driving wooden pegs into the trunk at intervals so as to form foot-rests. The herb has a pungent aromatic taste like a mixture of ginger and orange-peel, and is highly esteemed as a stomachic. As already stated, there is quite a large trade in this article, and we met Chinese merchants who were buying all they could get hold of. It sells from ten to twelve tael cents (3*d.* or 4*d.*) per pound.

At Lu-kou I took careful measurements of the Salwin, and found it to be of the dimensions shown in the cross-section (see map) which gives an approximate discharge of 23,000 cubic feet per second. The water was clear and of a beautiful blue-green colour; the banks are strewn with huge boulders, chiefly of granite, and there are occasional strips of silver-grey sand, evidently of granitic formation; the bed of the river is rocky, and there are frequent rapids. The river is evidently liable to a great rise at certain seasons, as its banks showed a water-mark fully 15 feet above water-level, and grass and sticks and other *débris* were hanging in the branches of trees on the banks high above our heads.

From Lu-kou there are two river-routes, one on either bank. That on the left bank had been followed by Prince Henry of Orleans during his brief excursion to the Salwin in 1895, whilst that on the right bank was said to have been used by Mr. Litton, of the extent of whose explorations in this district I have not yet seen any account. I chose the right bank, and started from Lu-kou on December 16. The Salwin valley has long been notorious for the extraordinarily precipitous and rugged character of its mountains and for its deadly climate. The bed of

the river, as is well known, lies at an extremely low level relatively to the surrounding country, and I found that at a point a few miles north of Lu-kou it was only about 3000 feet. The mountains on either side rise to heights varying from 10,000 to perhaps 15,000 feet, and their slopes are extraordinarily steep and precipitous. At rare intervals there are small patches of flat land in the folds at the foot of the slopes, but, generally speaking, the slopes descend straight to the water's edge, except where they are sheered off as it were into vertical cliffs of rock. Even to walk on these slopes without artificial means of support is often extremely difficult, and the only means of communication are narrow footpaths which wind up and down and in and out of the deeply indented hillsides. These paths are usually high above the

LISSUS IN FIGHTING DRESS. A SHIELD OF SKIN IS WORN ON THE BACK, AND THEIR CROSS-BOWS ARE ON THEIR SHOULDERS, BUT THEY ARE NOT WEARING THEIR SWORDS AND SATCHELS. THESE MEN WERE DRESSED FOR THE OCCASION, AND ARE NOT FULLY EQUIPPED AS THEY WOULD BE IF GOING ON AN EXPEDITION.

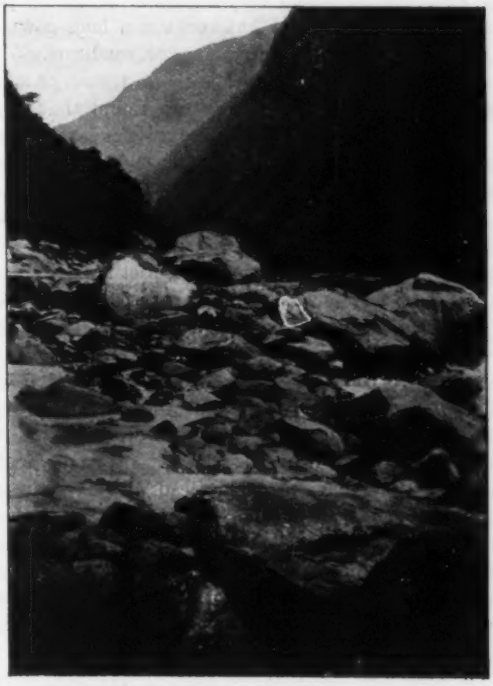
river, but sometimes they descend into its bed, when the unfortunate traveller has to drag himself over immense boulders, and rocks of all sizes from a few tens to several thousands of cubic feet, and where he must sometimes crawl along the face of a vertical cliff literally hanging on by fingers and toes, or has sometimes to climb a precipitous wall of rock, where loads, etc., have to be raised or lowered by ropes; or, again, has to cross a steep smooth slope of bare rock where a slip would send him to certain destruction in the boiling torrent below. The hillsides are chiefly covered with grass or brushwood, having been largely denuded of forest, but numerous patches remain, and one encounters widely different types of vegetation as one ascends the mountains, the lower levels presenting all the features of semi-tropical jungles, whilst pine and oak and other hardy trees are found on the upper slopes.

The deadly character which the Chinese attribute to the climate of the Salwin valley is well known, and many travellers have alluded to the superstitions that this has given rise to, notably Mr. Colborne Baber, who gives a striking account of the Salwin valley in his 'Notes on the Route of Mr. Grosvenor's Mission,' where he says, "we then discovered the strange fact that this valley is uninhabitable during the summer months on account of the malaria, the natives retiring as soon as the fields are planted, and returning to reap them in the autumn." This must apply to the particular district he travelled in (lat. 25° 0'), as, in spite of repeated inquiries, I failed to find any local belief in these deadly attributes, whilst there was no evidence of any abnormal sickness or mortality in this region. Our visit was made during the winter season when the weather was cool and pleasant as a rule, the mean day temperature during the five weeks we spent there averaging only 51° Fahr. The temperature, of course, varied considerably with the altitude, and the natives admitted that the low-lying villages suffered much from malaria, probably on account of the stagnation of air in the deep land-locked valleys, and the semi-tropical vegetation found there; similar statements, however, had been made to us at many places in Yunnan, and quinine was always in great demand.

The rugged and mountainous character of this part of the Salwin valley, and the evil reputation its climate has been said to possess, are not suggestive of a populous region, yet one of its striking features is the comparative density of the population which finds a living there. Almost every valley contains one or more villages, and the hillsides, steep though they be, are dotted with villages, which are built at all elevations right up to the snow-line, on the tops of spurs, or wherever the formation affords a sufficiently gentle slope to admit of buildings being erected and land cultivated. These villages are practically self-contained, and there is little or no trade between them. There are no markets and no shops, every family providing for its own wants by the labours of its members. The soil is a fertile one, but, owing to the steepness of the land, only limited areas are brought under cultivation. Some rice is grown in the Liso country, but this grain is almost unprocurable further north. No cotton is grown, cotton goods being imported from T'êng-yüeh Ting and Yung-ch'ang Fu, but a coarse undyed hempen cloth is manufactured locally by the women.

Travelling northwards from Lu-kou, the difficulties of the route continually increased, and our rate of advance was proportionately slow, a whole day's hard work often resulting in a net advance of only 4 or 5 miles. It was not many days before it became impossible even for unladen animals to accompany us, and I had to dispose of the two donkeys, whilst the number of coolies was increased to fourteen in order to lighten individual loads. On our way north we passed through Cheng-ka, recently the scene of tribal warfare.

A little beyond Tsao-ku-ti we left the Liso country and entered that of the independent tribes, who at this point are called Ulu Lamas. The change of type was sudden and complete, the dividing-line between the territory of the two tribes being a steep and lofty spur from the main range. The Ulu Lamas are a tribe possibly of Tibetan origin, as the name Lama implies, Lama Ti (*i.e.* the ground or territory of the Lamas) being



VIEW OF THE SALWIN VALLEY, LOOKING NORTH, IN THE ULU-LAMA COUNTRY. THE ROCK-STREWN GROUND IN THE FOREGROUND IS THAT OVER WHICH WE HAD TO TRAVEL FOR THREE WHOLE DAYS.

the Chinese name for Tibet; they inhabit the Salwin valley north of lat. 26° 19′, and are quite independent. They have no form of government, not even village headmen or chiefs. They are lawless and treacherous, and it would seem that life is held but cheaply among them; we were frequently shown the ruins of a house or hamlet and informed that the former occupants had been slain in some quarrel. They are armed in the same way as the Lisos, and, like them, are particular to carry their weapons wherever they go. In appearance

they are quite distinct from the Lisos. They are short but sturdily built, and their features are heavy and brutal in appearance; they are excessively dirty, their skin being coated with grime, and their whole appearance being suggestive of an absolute ignorance of the cleansing power of water. They wear their hair long, in shaggy locks, with a miniature queue which is usually hidden under a skull cap or turban. They told us that they shave the forehead in Chinese fashion once a year, an operation which they described as a very painful one. The men's dress consists of short knickers and a long gown or tunic of homespun hempen cloth, usually in a ragged condition. Their heads, as already mentioned, are covered with either a turban or a close-fitting skull cap, and they wear a band of split cane round the leg just below the knee. The women wear petticoats and a short coat, and are fond of wearing bead necklaces, silver earrings, etc. Clothing is scarce and in great request; we were continually pestered with requests for presents of clothes. The tribe supports itself by hunting and agriculture, but the latter is carried on in the most haphazard and wasteful fashion. There is but little rice grown, and the staple diet is Indian corn. Their language appears to be closely akin to the Liso, but is not identical. They have no written language, but transmit messages, etc., by notches on a piece of wood. They are inhospitable to strangers, very few of whom ever enter their country, and they have a deeply rooted objection to work. The women do all the household work, besides drawing water and bringing in firewood, etc. Their country contains iron and silver, both of which we saw being worked, and we heard rumours of gold. In common with the Lisos, they bury their dead, and have an aversion to either burning or dismembering the corpse. They bury them in their gardens or anywhere adjoining their houses, the grave being marked by a wooden frame, from which are suspended the weapons of the deceased in the case of a man, or a cooking-pot and "housewife" in the case of a woman. They also make offerings of food and clothing, etc., to the dead.

It was on December 23 that we entered the territory of these wild people, and a week later, after a series of severe and toilsome marches over the rock-strewn banks of the Salwin, we reached Lan-chia-ti, in lat. 26° 29′ N., where we were obliged to halt in order to collect supplies. My transport at this time consisted of fourteen coolies, eight of whom were Lisos. The latter had shown evident signs of panic ever since leaving their own country, and on halting at Lan-chia-ti they took the opportunity to desert in a body by night, leaving us with only six Chinese coolies to carry fourteen loads. The attitude of the Ulu Lamas had so far been outwardly friendly, if not over-civil. It was a festive season, December 27 being their New Year's Day, and they were celebrating the occasion with feasting and much drinking. They brought small presents to me, such as a lump of salt, a couple of

eggs, or a slice of pork—things of little value, but significant of good will. As soon, however, as they found we were left stranded by our coolies their attitude changed; they refused to supply either food or transport, in spite of liberal offers of silver, and they showed by their manner that they quite understood the fix we were in. After abandoning everything we could spare, we made several attempts over the most trying country to cross into the Irawadi basin. To my intense chagrin we were forced to return to the Salwin by the cowardice of the coolies, who absolutely refused to go on. We now returned still further south to Lu-ch'ang, from which place there is a regular trade route across a comparatively low pass, which is open practically all the year round. Here we crossed without difficulty, the snow being only knee-deep, and on January 21 we entered the basin of the Irawadi.

The change, both in the physical characteristics of the country and the type of its inhabitants, is most striking: on the eastern side of the pass one is in China, on the west one finds one's self in what may be described as an extension of Burma, and when the question of frontier delimitation has to be decided in this locality, there is no doubt that the mountains of the Salwin-Irawadi divide ought to be accepted as the political, as they are the geographical and ethnological, boundary of China.

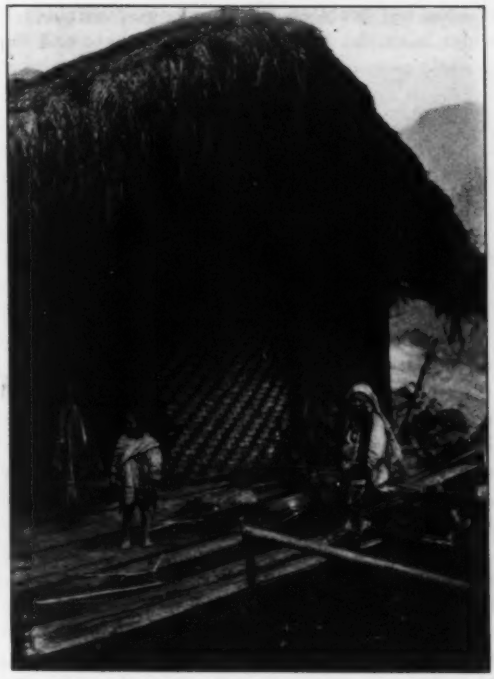
Our route from the Lu-ch'ang pass entered the valley of the Hsiao Chiang (small river), as the Chinese call the small river which is marked on the map as the Ngaw-chang Hka, and we found ourselves in a country which, though mountainous, was obviously of a much lower average level than the district we had just left. No flat land was visible, the mountains seemed jumbled in picturesque confusion, and were covered in heavy jungle, in which bamboos, and plantains, and orchids, and other of the smaller forms of tropical vegetation mingled with gigantic trees of different kinds, whilst monkeys and parrots and other of the tropical fauna were frequently met with. Behind us the snow-clad range we had just crossed stood up like an enormous wall, shutting out the eastern horizon and towering above the less-imposing heights we were now in the midst of. The Lu-ch'ang pass is the outlet of a recognized trade route between Lu-kou and T'êng-yüeh T'ing, and we were informed that Mr. Litton had more than once travelled this way. The Têng-yüeh T'ing road turns south from a point a little beyond Tawng-gaw, west of which the communications are—except in the immediate vicinity of the villages—mere tracks through the jungle. Travelling due west, we followed the course of the Hsiao Chiang for several days, crossing it more than once by the ingenious bridges in use here. These bridges are much superior to the single-rope bridges of the Salwin; they are made of canes and creepers—one rope forming the footway, and two others the handrails, with a network of smaller canes connecting them.

The inhabitants of the region we now passed through are of two distinct types, called by the Chinese Tsa-shan-jên and Langsu-jên respectively. The former inhabit the head of the valley of the Hsiao Chiang, and at this point are said to be under the government of the T'ussu of Tengan on the Salwin, though it was admitted that the government was more in name than in fact. They have a distinct language or dialect of their own, but many of them speak Chinese. Their appearance is ugly, dirty, and forbidding, and they are classed by the Chinese as Yi-jên, or wild men. They dress much like the Lisos, with knickers, cloth gaiters, and shell-embroidered shoulder-belt and satchel, but do not use the crossbow, being armed with the Burmese "dha," or short sword, or occasionally with a spear. They neither shave the head nor wear the queue, but tie their hair into a loose top-knot which is bound round with a puggri. The men pierce the lobe of the ear and insert bamboo tubes, etc.; whilst the women, who wear voluminous petticoats, indulge in numerous large earrings of brass wire which are about 4 inches in diameter.

The Langsus are more akin to the Kachins or Singphos of North Burma; they inhabit the basin of the Nmai Hka or Langsu-ta Chiang (called also Puma Chiang or Puma Hka, *i.e.* the Puma or Burma river). The men wear the Burmese waistcloth and a short coat of Chinese pattern, and are armed with the dha; their hair is usually cut short at the neck. The women wear a short coat and a cotton cloth of many colours wrapped round the breast, and, like the Tsa-shan women, indulge in many necklaces and earrings of portentous size. In common with the Tsa-shan-jên, both sexes chew betel, and they exhibited an extraordinary craving for opium. One of our party had a little opium, tiny pellets of which he bartered for food, etc., and it was evident that had we possessed a stock of the drug, we could have lived for next to nothing, and should have met with a hearty welcome as traders. I was taken for an opium merchant, and our baggage was supposed to be full of that commodity; wherever we went the villagers pestered us for opium, and would pursue us for miles in vain attempts to obtain it. Silver was of little purchasing power, and we had the greatest difficulty in obtaining supplies, our presence being regarded with more fear and suspicion than cordiality.

The type of house which these people dwell in is one which, with very slight variations, extends throughout the Kachin or Singpho country right through into Assam. They are long, low, one-storied buildings, and are often occupied by several families, presumably of the same stock or clan, the interior being partitioned off into numerous recesses, besides having two or more cubicles. The framework is of timber, and the floor is raised some 4 feet above the ground, access being obtained by a sloping log with notches cut in it. The walls are of bamboo, and are only 3 or 4 feet high; the roof, which is of bamboo

thatched with grass or palm leaves, being very high pitched, and the eaves descending to floor-level. There are no windows, but small doors are cut at intervals in the low walls, which, when open, admit a very limited amount of light. At each end the roof is prolonged over a space which is fenced in and serves both as a cattle-pen and as a place for husking rice, weaving cloth, or other household occupations. The gables project beyond this space, and the roof is undercut so that the peak of the gable extends far in front of the eaves. The post which



ULU-LAMA WOMAN SPINNING YARN AT THE DOOR OF HER HOUSE, SALWIN VALLEY.

supports the gable at the front of the house is decorated with the horns of buffalo and oxen, the number of which is an indication of the prosperity or wealth of the residents. The floor is of bamboo-mat, with a hearth of mud plaster to each compartment, the smoke of the fires finding an exit as best it may through the doors.

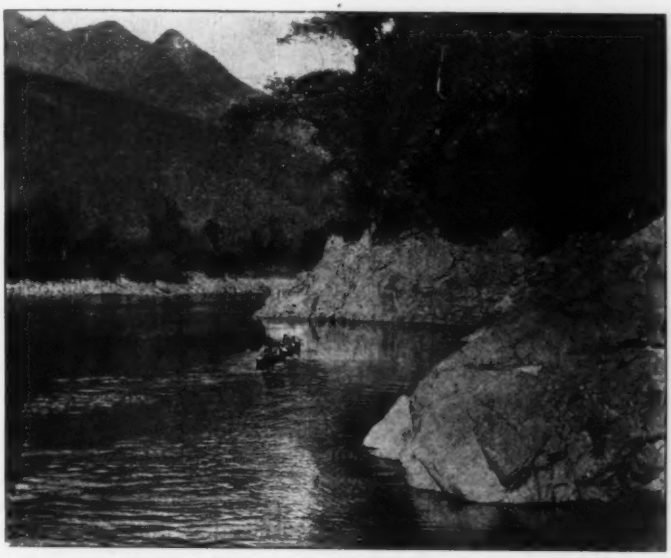
That part of the basin of the Nmai Hka which we passed through may be described as rich and fertile in spite of its mountainous character. We saw tea, indigo, cotton, tobacco, oilseed, and other useful plants,

the foregoing varieties often growing simultaneously in the small patches of cultivated land adjoining the villages. Rice is also grown wherever the ground admits of it. The tea plant is indigenous to the district, growing wild in the jungle, and is not of the Chinese variety, but of a similar type to the Manipuri or indigenous plants of Assam. The leaf is manufactured by the inhabitants on a small scale by drying it in the sun, after which it is packed into bamboo tubes. The climate of this region was hot, close, and oppressive, and we suffered from attacks of malaria. A very poisonous variety of jungle fly also caused us much trouble, and doubtless was largely responsible for the malaria. This fly, which resembles a small house fly in shape and size, is striped like the anophele mosquito. It inserts its proboscis into the skin and draws blood; the bite does not hurt at the time, but several hours afterwards the wound swells and becomes painful, and the irritation continues for several days, accompanied by a watery discharge.

After following the course of the Hsiao Chiang till it turned northwards, we crossed the range which divides it from the Nmai Hka, whose tributary it is, at a height of about 7200 feet, and reached the banks of the latter river on January 28, when the measurements were taken which are shown in the cross-section (see Appendix A). These measurements give an approximate discharge of 28,000 cubic feet per second, *i.e.* more than 20 per cent. larger than that of the Salwin, and more than double that of its sister stream, the Mali Hka. The water of the river is of a different hue to that of the Salwin, being a dark olive-green; it is clear and free from silt. The bed of the river is strewn with rocks of granite and quartz, etc., and there are rapids which obstruct navigation. The banks of the river show that it is liable to a considerable rise in flood-time. The valley through which the river flows is at this point of peculiar section. The lower slopes are extremely steep, but at a height of several hundred feet above the water they are comparatively gentle; the formation suggests that the river has cut its way down into its present narrow channel through what was originally a broad and comparatively shallow valley.

After crossing the river, we ascended the range which separated it from the Mali Hka or western branch of the Irawadi. The range is a comparatively low one, being only about 6000 feet where we crossed it; its summit is broad and undulating, and, though thickly covered in heavy jungle, there is a fairly good path from Laung-pam on the east to Ning-ki on the west. After crossing the watershed, we turned north-west and shaped a direct course for the Mali Hka. The country we thus entered is in many respects quite different to that we had recently passed through. To south and east are mountain ranges, but to the north and west the country opens out, disclosing a wide view of low hills and undulating slopes. This district is a populous and fertile one, and is well watered by numerous streams, whose placid

waters and sandy beds bear little resemblance to those of the rocky torrential tributaries of the Salwin, the Mekong, and the Nmai Hka. There are numerous large villages whose inhabitants are evidently prosperous and in a far higher stage of civilization than the wild tribes of the Chinese frontier. The land is chiefly covered in thick forest, but large areas adjoining the villages are under cultivation; quantities of rice are grown, as well as sweet potatoes and other vegetables, and we saw magnificent rubber trees, enormous banians, and, in fact, practically all the luxuriant vegetation of the jungles of Assam. Good roads have been made between the villages, and the one by which we



RIVER NMAI HKA: OUR PARTY CROSSING IN A "DUG-OUT" CANOE.

travelled was evidently a main route, and, though of course not metalled, was well kept and properly graded and drained, and we were now able to push on rapidly. No animal transport is used in this country, and there is no large transit trade, the villages being almost entirely self-supporting and independent of imported goods.

The inhabitants of this region, which extends northwards as far as the boundaries of the Hkamti Long district, call themselves Pu-ma (*i.e.* Burma) men, but are in appearance, dress, and customs, etc., identical with the Singphos of the Assam frontier. We were, of course, unable to converse with these people, but the few words of their language which we did acquire served us equally well among the

Singphos, and I believe that their language is the same. They are brown-skinned, of medium height, and slight build, with features of the Burmese type. The men wear a straight waistcloth or kilt, and a short coat; their hair is either cut short at the neck or worn in a topknot, and they wear a broad-brimmed palm-leaf hat with a small conical crown. They are armed with the "dha," but occasionally carry spears as well, and we noticed a few flint-lock tower muskets, one of which I observed was dated G.R. 1815. The women wear a coloured cotton cloth similar to the Indian "sari," which they wind round them so as to form a dress. Their breasts are bound tightly down by the cloth after the fashion of the Manipuri women; but, like other natives of hot climates, they are very free and easy in their dress, and display their bosoms freely, often removing the cloth altogether above the waist. The clothing of both sexes is of local manufacture, cotton weaving being one of the most important of the feminine duties. Women take a large and active part in the maintenance of the household; they spin yarn, weave cloth, cut grass for thatching purposes, husk rice, and superintend the poultry yard, besides performing many of the lighter duties of the cultivator, such as reaping and weeding, etc.

The houses of these people are similar to those of the Langsus, and, as with that tribe, each village has a headman or chief whose house is usually distinguished for its superior size, and the number of buffalo-horns with which its portals are decorated, and by an arrangement of logs a short distance in front of it somewhat like the letter W. Again, similarly to the Langsus, they burn their dead, the ashes of the corpse being placed in an oblong wooden box, shaped roughly like a mummy and approximately the size of the dead person's body. This box is supported above the ground on bamboo trestles, and is sheltered from the elements by a roof of a more or less elaborate character according to the position the deceased held; thus the remains of ordinary individuals are merely roofed over by a small shed, whilst those of the headmen and their families are placed inside large dome-shaped erections of bamboos, thatched with palm leaves, and provided with a door through which the mourners can enter. The summit of the dome is decorated with a pair of buffalo-horns, or imitation ones of wood. A small bamboo pedestal is erected by the side of the bier, and on this various offerings of food, etc., are placed, whilst the urn itself is often wrapped in a blanket or other clothing as a protection against cold.

The reception we met with from these people was not altogether unfriendly, but they exhibited an extraordinary objection to selling us provisions, etc., and we often came near to a serious fracas in our attempts to procure the necessaries of life. Their diet consists chiefly of rice, but they have poultry and eggs, fish, pork, etc., though they almost invariably denied the existence of these articles, or produced

them in such minute quantities as to be useless to us, whilst demanding exorbitant prices; consequently we had to exist largely on rice during our passage through their country. They are not a trading people, and they had no wish to deal with us, whilst they undoubtedly looked on us with suspicion and fear. Here, as amongst the Langsus, there is a great demand for opium, and I have no doubt that one reason we passed without molestation was because of our reputed character of opium dealers bound for Hkamti. In connection with this, it is interesting to note that the Chinese appear to have traded throughout this country, even as far as the Hkamti Long district. We were told that this was

VILLAGE SCENE IN THE VALLEY OF THE NMAI HKA. HOUSE AND NATIVES ARE LANGSU OR SHANS. THE MAN WITH THE GUN IS ONE OF MY CHINESE SERVANTS.

the case, and occasionally we came across men who knew one or two Chinese words; the Chinese mode of address "Lao-ban" was often applied to my servants, who were spoken of as Kuang-tung men (*i.e.* Cantonese).

The climate of this region in January and February was warm and moist; the daily mean temperature was only about 55° Fahr., but the humidity made the air very oppressive, and there were frequent thunderstorms.

We came in sight of the Mali Hka on the morning of February 2, when we noticed a phenomenon which appears to be of frequent occurrence in this district. Our route was at a considerable elevation above the valley of the river, and we looked out over a vast sea of

dense milk-white mist, which completely screened the river and the low-lying ground before us, only the tops of the hills protruding above it like islands. Far away to north and west stretched a high wall of snow-clad mountains—those of the Patkoi and Namkiu ranges—forming a huge semicircle, as it were, which barred the way to India and Tibet; above the mist all was clear and bright, and the snowy barriers on the horizon glittered in the morning sun, whilst below us all was hid from view by the mist. It was a striking and curious sight. About 11 a.m. the mist slowly rolled away, and we now enjoyed a spacious view of the valleys before us. These morning mists are of dense white vapour saturated with moisture, which falls pattering on the leaves of the trees like drops of heavy rain. They are probably of a malarious character, and some of our party suffered from that malady during our stay in this region. Similar mists are common in Assam during the cold weather, and I noticed a like phenomenon in some of the valleys of the Singpho country on the borders of that province.

The Mali Hka is very different in character to its sister stream, the Nmai Hka. It is comparatively shallow, its maximum depth being only 20 feet, and it is much broader, whilst its current is less swift, and its discharge is only some 13,000 cubic feet per second, or less than half that of the Nmai Hka. Unlike the Nmai Hka, which is confined by steep and rocky banks, it flows between low banks of earth, which are covered in dense jungle; its waters are clear and of a dark olive-green hue, and they abound with fish. There are rocks and rapids which prevent navigation, but its bed at this point (lat. 26° 21′) is chiefly of sand and clay. The river is apparently not subject to any great rise in flood-time, its high-water mark being only some 5 feet above the water-level.

Beyond the Mali Hka we turned northwards, following what is a main trade route from British Burma to the Hkamti Long district. The jungle now became thicker, and clearings less frequent, whilst roads only existed in the immediate vicinity of villages, the route otherwise being a mere jungle path which often lost itself in streams whose course it followed. At length, some ten days later, after marching for two days through an uninhabited belt of jungle, we emerged at Intaw, in the Hkamti district, and a day's march further we reached the town of Langnu, from which point I had determined to attempt the passage of the Chaukan pass.

We now found ourselves in a country which, though in most respects similar to that we had just passed through, is populated by a distinct tribe or race who boast of a king, whose capital at Putau is also called Hkamti. We were now on comparatively well-known ground, the kingdom of Hkamti having been explored by a survey party from India in 1895, under Woodthorpe and Macgregor, of whom we found traces in Langnu, by Errol Gray in 1892, and by Prince Henry of Orleans in 1896.

Langnu is a town, or rather a collection of four villages, on the right bank of the Nam Kiu, a tributary of the Mali Hka, and is the head-quarters of the "Chowpa," or headman of the surrounding district. On arrival there we were received in a most cordial fashion; we were invited to stay in the "Chowpa's" house, and were furnished with ample supplies. As soon, however, as it leaked out that we were bound for India, all sorts of difficulties were put in our way, and neither guides nor coolies were forthcoming. The maps which I possessed showed two villages on the Hkamti side of the Chaukan pass, and the Hkamtis furnished me with the names of ten stages on the route, which seemed to imply that it was inhabited. Accordingly, after spending a day in fruitless efforts to obtain transport, we started

HOUSE OF THE HEADMAN OR "CHOWPA" OF LANGNU, IN THE HKAMTI DISTRICT.

for the pass without guides, carrying a supply of rice sufficient for a week.

A few miles from Langnu the route entered an enormous tract of jungle, which extends without interruption from this point, across the Namkiu and Patkoi mountains far down the valley of the Dihing river, with only a solitary break near Kumki. We marched westwards, groping our way through dense, gloomy, and uninhabited forest, where we followed the tracks of rhinoceros, elephant, buffalo, tiger, and other wild beasts, and where our only guides were the compass and the faint trail or "blaze" with which the trees were marked at intervals. It rained the whole time, and we were attacked by incredible quantities of leeches and poisonous insects. At night we camped, or built ourselves shelters of bamboo, and kept fires alight to ward off the wild beasts. After five days we failed to see any signs of the villages marked on the map, whilst the stages mentioned by the Hkamtis proved to be the

sites of long-extinct villages, now distinguishable only by the remains of graveyards deeply buried in the forest, which showed no signs of ancient clearings or cultivation. Food was now running short, and it became necessary to give up the attempt. We returned by forced marches and on very short rations, and with difficulty succeeded in regaining Langnu just as our supplies gave out.

The coolies were so exhausted and footsore after this experience that we had to halt for a week at Langnu. Provisions were collected, and, by means of the bribe of a gun, guides were obtained, and on March 2 we set out on a second attempt to cross the Chaukan. Again we entered the jungle, but after another period of wandering the guides proved incapable and unable to find the route over the passes, so that, in spite of having ample supplies, we were at length obliged to return once more. This time, however, we did not reach Langnu, as before emerging from the jungle we encountered a party of Hkamtis who were setting out on a journey to Assam to bring back an elephant for one of the local headmen, and, after some palaver, we arranged to attach ourselves to their party and travel in company. Some of the coolies were too weak to go on, and we had to allow them to return to Langnu, which meant that their loads had to be thrown away, as we were already laden to the utmost.

This third attempt proved successful, and at length, on March 15, we crossed the watershed of the Dihing and entered what is, geographically speaking, Assam. We found that the villages of Mokoshat and Galut no longer exist, though we camped on their sites, and that the route over the Chaukan pass is now disused in favour of one which crosses the neighbouring height of the Songsan Bum, which, though somewhat longer, is said to be easier. We followed the disused route, and had to frequently cut our way through the thickly growing bamboos and fallen trees, etc., so that our progress was necessarily very slow, especially as the natives themselves had the greatest difficulty in finding the track, and frequently lost their way. Altogether we were nineteen days from the time we left Langnu on our second venture until reaching the first village on the western side of the pass, and during most of that time we had to travel on short rations, whilst the rain fell almost continually. Frequently there were heavy thunderstorms, and on the heights we experienced hail, and sometimes even snow.

Our companions, the Hkamtis, travelled in the most leisurely fashion, and observed several curious customs, some of which were doubtless based on practical experience as well as on superstition. Thus they prohibited us from burning bamboos until they had been split or notched, so as to allow the air and water to escape, as the loud reports which they would otherwise make were said to be infallible rain-producers—an idea which, considering we were among the clouds, and in an extremely rainy locality, was probably not devoid of reason.

They also forbade us to speak above a whisper on the mountains, as they said that if we made a noise we should certainly have rain. Later on, however, when we had descended to lower levels, these prohibitions were withdrawn. On the summits of mountains, or after specially difficult undertakings, such as the passage of rivers, etc., prayers and offerings were made, the latter being placed on small bamboo pedestals, and consisting of a little rice or some leaves or grass.

The long sojourn in the jungle and continued short commons told severely on our Liso coolies, who became terribly weak and sickly and dispirited, and it was a great relief when we at length emerged suddenly from the forest and found ourselves in a long grass-grown valley, with low hills to the south, and a lofty range of snow-clad mountains to

RIVER SCENE NEAR LANGNU, IN THE HKAMTI DISTRICT.

north of us. The route now followed the banks, and often the bed, of the Dihing, and we soon reached Kumki. Kumki is a village of some 200 to 300 inhabitants on the left bank of the Dihing; its inhabitants are Singphos, a tribe which is so identical with that which I have already described as inhabiting the basin of the Mali Hka, that there is no need for further description. Our reception by them was not pleasant, and we had to use threats in order to obtain food. Five days more of jungle travelling, accompanied by the usual amount of rain and leeches, etc., brought us to the Dihing again, where, owing to the river being in flood, it was impossible to ford it, and we were thus in measurable distance of starvation, as our supplies were almost exhausted, and there were no villages on our side of the river. Fortunately, a band of Mishmis who we encountered were in the same plight, and constructed a rope bridge by which we were enabled to cross to the other bank.

The method of construction was interesting. First a thin string of split cane about $\frac{1}{8}$ inch in width was prepared, and a round pebble securely fastened to one end of it. Then the experts of the party exercised their skill in hurling it across the river. The Dihing at this point was about 100 yards across, so that the operation was not easy.

The thrower whirled the stone round and round by a sufficient length of string, and then, when it had acquired enough momentum, hurled it with all his force across the river, where it was made fast by some compatriots who had come to the assistance of the party. Then three ropes of whole cane, about ¾ inch in diameter, were hauled across by means of the string and made fast to tree-trunks on either bank, so as to form a triple rope of adequate strength. The bridge was now ready, and loops of cane were made and tied over the rope. The passenger sits in the loop, and hauls himself across backwards (*i.e.* head first) by his hands, propelling himself by his feet at the same time. When women have to cross, they are trussed on to the rope so that they cannot fall off, and then have to haul themselves across by the arms only, their feet being tied on the rope. The Mishmis crossed first, and accomplished the feat skilfully enough; but it is not easy for an amateur, especially when there is a boiling torrent some 20 feet below one, and we found it difficult and exhausting work.

Across the river our troubles were nearly over, but it was still a day's march to the first village, and between us lay the Daphapani river, where we again found ourselves cut off by the swollen stream from the food we required. Fortunately, before matters became desperate, we were relieved by a band of friendly Singphos, who provided us with food, and rafted us across the river as soon as the waters had subsided somewhat. We were now on British territory, the Daphapani being the limit of effective British rule in this direction, and from this point we descended the Dihing without difficulty, and a week later reached Sadiya, and once more came in contact with civilization.

The results of the journey I have described can only be gauged by expert geographers, and I am well aware that, in comparison with the time occupied and the distance covered, they are insignificant; nevertheless, some new areas have been explored, and the existence or practicability of a direct trade route from China to India demonstrated. The course of trade, like water, follows the line of least resistence, and our difficulties in the Salwin valley were largely due to our attempts to explore a region in which no trade exists. When following the trade route across the Pien-ma pass through the basin of the Nmai Hka, we encountered no serious difficulties, except those due to our ignorance of the language and the distrustful attitude of the natives—the latter, I believe, being largely due to the former cause, though, doubtless, also based on a well-founded fear of foreign invasion and interference. Our passage through the Singpho country and into the Hkamti district was also a main trade route, which, as already pointed out, has been used by Chinese traders as well as by the inhabitants of the country. This district is both fertile and populous, and the physical characteristics of the country render it suitable for the construction of lines of communication, such as railways and roads.

The chief obstacle on the route to India is undoubtedly the vast tract of uninhabited jungle between Hkamti and Assam; yet it is to be noted that a trade route existed here at one time, as is shown by the remains of the old villages which are to be seen on the present track, whilst even now there is a small trickle of trade (passing chiefly by the Songsan route), which might possibly be enlarged. The actual trade is of the smallest, for the reason that any one making the journey has to carry such a large stock of provisions as to preclude the possibility

THE "CHOWPA" OR HEADMAN OF LANGNU, IN THE HKAMTI DISTRICT.

of carrying much merchandise — though I found that Indian tea, blankets, and matches were known and used in Hkamti—but parties of natives are in the habit of passing through to Assam and back from time to time.

The chief difficulties of this forest track are the lack of roads and supplies, and the heavy rainfall, whilst the lofty ranges of mountains strictly limit the number of possible routes. I heard of two other routes besides the one I travelled by, viz. one over the Songsan Bum, and one through Manse and down the valley of the Daphapani river, the latter being that followed by Prince Henry of Orleans. West of Kumki the configuration of the country is not exceptionally difficult, and I believe

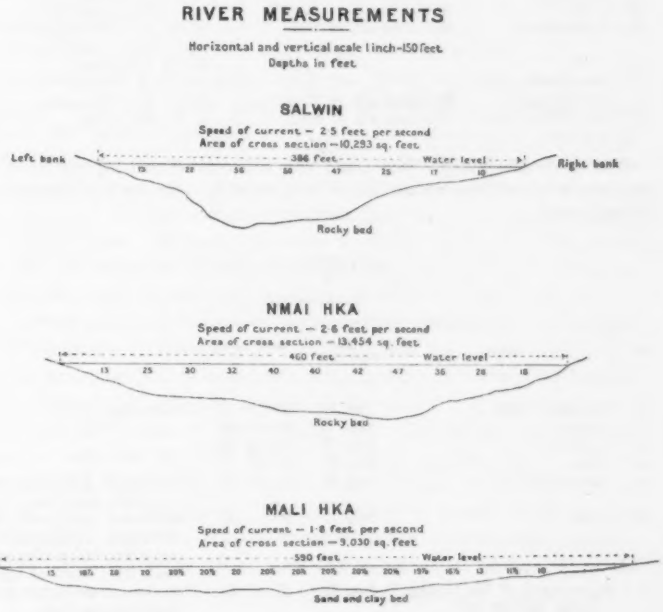
it would be quite feasible to construct a railway up to the Dihing valley to a point near Kumki, and then through the Patkoi hills, and down the valley of the Sinan Hka.

Although, as I have shown, I travelled by what is probably the easiest and most direct route from Yün-nan to Assam, yet it should not be supposed that such a journey is an easy one. As in any expedition of this kind, our chief difficulties were those of commissariat and transport, for though in China we found no difficulty in obtaining supplies and the means of carrying them, and in fact were received with cordiality and treated with respect and hospitality, yet almost everywhere west of the Salwin the reverse was the case, and, though in a land of plenty, it was often only possible to obtain food by high-handed methods which only necessity could warrant, whilst it was frequently impossible to recruit coolies for transport purposes. I, of course, paid liberally for all supplies, but more than once we had to "commandeer" rice, etc., in spite of the obviously false statements of the villagers that no kind of provisions were to be obtained.

Many of our difficulties arose from ignorance of the language, as, although I speak Chinese and Hindustani, neither of those languages were of use much beyond the frontiers of the two empires. On the other hand, I believe that it was the smallness and insignificance of my party which enabled us to travel so freely through the districts where white men had never been seen, and where his presence is regarded with the greatest suspicion. That we never encountered active hostility is creditable to the natives, and also, I think, in some degree to the various members of my party, and in conclusion I must again record the admiration I feel for the pluck and fidelity of my two Chinese servants.

## APPENDIX A.

The accompanying cross-sections were all taken in the following manner: (1) The width of the river was triangulated from a measured base. (2) The soundings were taken with a measured rope, marked at every 5 feet, and weighted with a stone; the intervals between soundings being judged so as to be as equal as possible. (3) The sections were taken on a straight reach of the river not in the immediate vicinity of the rapids. (4) The speed of the current was measured with a bamboo float about 10 feet long, weighted at one end to keep it upright and immersed about 6 feet below water. This float was placed in the water from a boat or raft at the approximate point of maximum velocity, and its speed was timed between stakes on the bank 300 feet apart.


RIVER MEASUREMENTS
Horizontal and vertical scale 1 inch=150 feet.
Depths in feet.
SALWIN
Speed of current — 2·5 feet. per second
Area of cross section —10,293 sq. feet.
Left bank
386 feet.
Water level
Right bank
13 22 36 50 47 25 17 10
Rocky bed
NMAI HKA
Speed of current — 2·6 feet. per second
Area of cross section — 13,454 sq. feet.
460 feet.
Water level
13 25 30 32 40 40 42 47 36 28 18
Rocky bed
MALI HKA
Speed of current — 1·8 feet. per second
Area of cross section — 9,030 sq. feet.
590 feet.
Water level
15 18½ 20 20 20½ 20½ 20 20½ 20½ 20½ 20½ 20½ 19½ 16½ 13 11½ 10
Sand and clay bed

These methods are, of course, only rough and approximate, and it would therefore be useless to make very elaborate calculations of the discharge of the river. Assuming, however, that the velocity observed was the maximum, the mean velocity, as given by accepted formulæ and confirmed by local experience, would be about 0·8 of the maximum; and adopting this ratio for the Nmai Hka and Mali Hka, we get approximate discharges of 28,000 and 13,000 cubic feet per second respectively. In the case of the Salwin, the section of the bed is so narrow and deep, and the current consequently so uniform, that I have taken 0·9 as a probable ratio, which gives a discharge of 23,000 cubic feet per second.

## APPENDIX B.

LATITUDES.

| No. | Name of place. | Method of observation. | Latitude. | Remarks. |
|---|---|---|---|---|
| | | | ° ′ ″ | |
| 1 | Meng-tze-Hsien | Ex-meridian alts. of Polaris | 23 16 1 | Fair. |
| 2 | Mien-Tien | Meridian alt. of Formalhaut | 23 36 55 | Good. |
| 3 | Do. | Ex-meridian alts. of Polaris | 23 38 12 | Good. |
| 4 | Yung-lung-Cho | Meridian alt. of Sirius | 25 48 9 | Fair. |
| 5 | Do. | Ex-meridian alts. of Polaris | 25 48 48 | Fair. |
| 6 | Fei-lung-Chiao | Meridian alt. of Sun | 25 47 20 | Good. |
| 7 | La-ha | Ex-meridian alts. of Polaris | 25 51 40 | Doubtful. |
| 8 | Do. | Meridian alt. of Rigel | 25 50 22 | Good. |
| 9 | Lu-kou | „ „ „ | 25 50 46 | Good. |
| 10 | Do. | Meridian alt. of Dubhe | 25 52 35 | Doubtful, sky hazy. |
| 11 | Mao-chao | Ex-meridian alts. of Polaris | 26 5 8 | Fair. |
| 12 | Do. | Meridian alt. of Rigel | 26 2 27 | Doubtful. |
| 13 | Lan-chia-ti | Meridian alt. of Sun | 26 29 42 | Doubtful, sky very hazy. |
| 14 | Do. | „ „ „ | 26 29 19 | Good. |
| 15 | Near Meng-chao | „ „ „ | 26 2 9 | Good. |
| 16 | Lao-Yang-Ka | Meridian alt. of Rigel | 26 12 50 | Moderate. |
| 17 | At R.Ma-li-Kha | Meridian alt. of Sun | 26 21 10 | Good. |

The above observations were made with a 7-inch sextant (by Stanley & Co.) and a mercurial artificial horizon, times being noted by a Benson's half chronometer "Field" watch.

## APPENDIX C.

LONGITUDES.

| No. | Station. | Object observed. | Longitude E. | Remarks. |
|---|---|---|---|---|
| | | | ° ′ ″ | |
| 1 | Fei-lung-chiao | Sun E. | 99 10 12 | Observation good. |
| 2 | La-ha | Star E. | 99 3 39 | „ „ |
| 3 | Lu-Kou | Star W. | 98 54 52 | „ „ |
| 4 | Do. | Sun E. | 98 55 5 | „ „ |
| 5 | Lan-chia-ti | Sun E. | 99 10 33 | Observation good, but error of watch doubtful; reject. |
| 6 | Do. | Sun E. | 99 3 39 | Observation good, and error of watch determined approximately by calculating back from deduced rate. |
| 7 | Right bank of Ma-li-Kha in lat. 26° 21′ 10″ | Sun E. | 97 57 43 | Observation good, but result probably too high. |

The above observations were made with a 7-inch sextant (by Stanley & Co.) and a mercurial horizon. The method used was that of chronometric difference of time, G.M.T. being kept on a Benson's half chronometer "Field" watch. In the case of the sun, the mean was taken of six observations of the upper and lower limbs at ten-second intervals of arc; and in the case of stars, the mean of seven observations at ten-second intervals of arc was taken. Unfortunately, the watch proved so susceptible to changes of temperature, in spite of its being fitted with a Bréguet spring and other improvements, that its rate was erratic, and as I was not able to rate it at sufficiently short intervals, the longitudes I obtained can only be considered as roughly approximate.

# THE HEART OF THE SOUTHERN ALPS, NEW ZEALAND.

By JAMES MACKINTOSH BELL, Director, Geological Survey, N.Z.

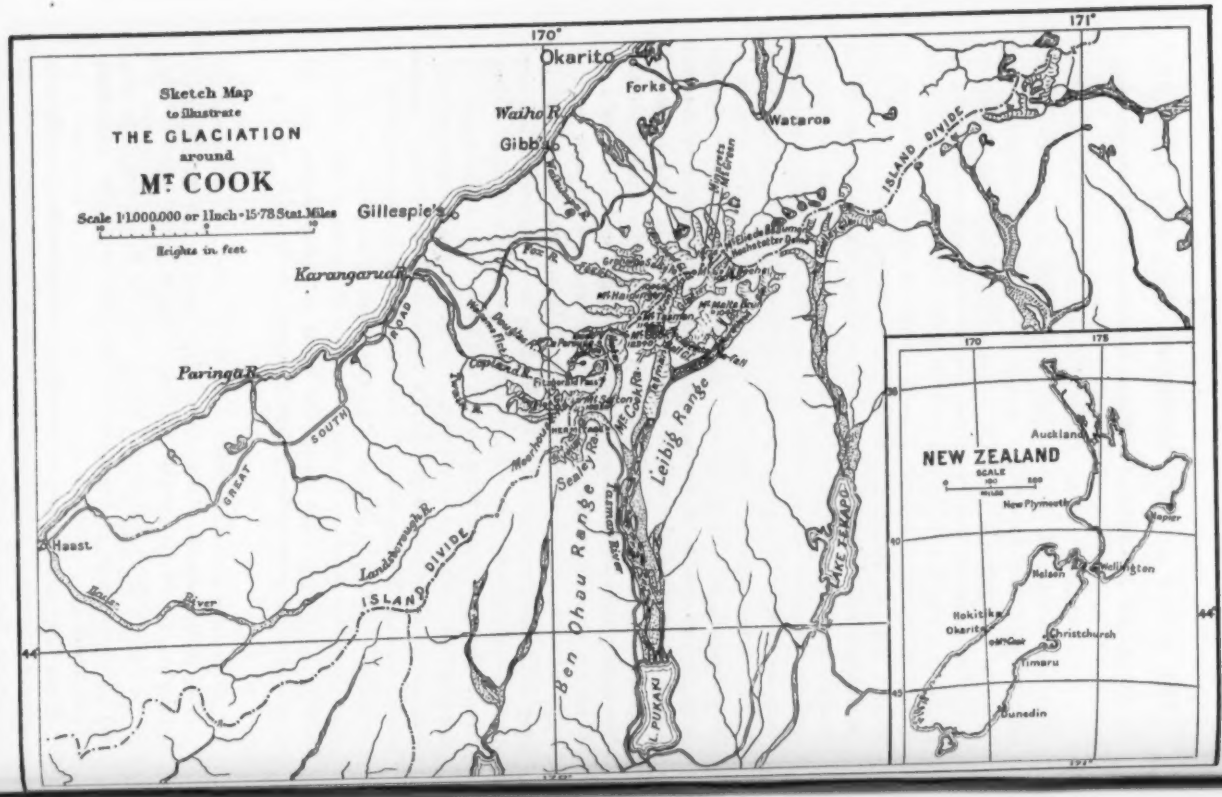
## Introduction.

The central part of the Southern Alps, which includes the elevated country surrounding the magnificent peak of Mount Cook, presents many features of remarkable interest to the glaciologist and physiographer, and exhibits an area of country of rare charm to the observant alpinist and explorer. This part of the Southern Alps encloses, in addition to Mount Cook, the lofty peaks of Darwin, Malte Brun, Hochstetter Dom, Mount Elie de Beaumont, Mount de la Bêche, Mount Haidinger, Mount Lendenfeld, the Silberhorn, Mount Hector, Mount Tasman, Mount Stokes, and Mount Sefton, all over 9800 feet in height, and rising, clad in perpetual snow, amid spacious fields of *névé*, from which emanate most of the great glaciers of New Zealand. These peaks represent the highest though not the most inaccessible country in New Zealand, and all stand near the island divide. A view obtained from various points of vantage on the divide discloses to the east and west most of the salient physical features of this interesting part of the country. Towards the west is visible the rapid descent of the country towards the Tasman sea; the rugged snow-clad peaks can be seen to be, near at hand, replaced by mountains with snow only on their summits and with their lowest slopes thickly wooded. These give way farther to the westward to wooded hills free from snow which close to the sea pass abruptly into flat or rolling lowlands, covered with dense forest. Towards the east the descent of the country is also rapid, but not nearly so much so as on the western side. The mountains gradually decrease in altitude, and are finally replaced by the rolling treeless stretches of the Mackenzie and Upper Waitaki plains, surmounted by an occasional outlying mountain. The sparseness of forest on the eastern side of the Alps stands in marked contrast to the western side, and only at a few sheltered spots along the lower mountain slopes, near the river courses, are visible the groves of stunted trees.

## The Great Tasman System.

Two sections across the Southern Alps—one by the Tasman river, Hooker glacier, Fitzgerald pass, and the Copland valley, and the other by the Tasman glacier, Graham's saddle, and the Franz Josef glacier—will illustrate some of the most striking features of this interesting glacial area.

The longest and widest glacier in New Zealand is the great Tasman glacier, which has a length of 18 miles from its source at the base of the Hochstetter Dom to its terminal face, and a maximum width opposite the


Sketch Map
to illustrate
THE GLACIATION
around
Mt COOK
Scale 1·1,000,000 or 1 Inch = 15·78 Stat. Miles
Heights in feet
170°
171°
Okarito
Forks
Waiho R.
Gibb's
Wataroa
Gillespie's
Karangarua R.
ISLAND DIVIDE
Franz Josef Glacier
Fox Glacier
Mt Hooker
Mt Tasman
Mt Cook
Mt Malte Brun
Mt Sefton
Mt Haidinger
Paringa R.
SOUTH
ROAD
GREAT
Copland R.
Hooker R.
Mueller Glacier
Tasman Glacier
Sealey Tarns
Mt Cook Ra.
Liebig Range
Ben Ohau Range
L. PUKAKI
LAKE TEKAPO
Haast
Haast River
Landsborough R.
ISLAND DIVIDE
44°
45°
170
175
NEW ZEALAND
SCALE
Miles
Auckland
New Plymouth
Napier
Nelson
Wellington
Hokitika
Okarito
Christchurch
Timaru
Dunedin
40°

mouth of the Murchison river, later to be described, of $2\frac{1}{10}$ miles. From the terminal face of the Tasman glacier flows the river of the same name, which enters Lake Pukaki, after a course of about $23\frac{1}{3}$ miles. For this distance the stream anastomoses in many channels, through a broad U-shaped valley. The various streams are constantly changing their courses—a condition which, with the many quicksands, renders the river a very difficult one to ford. The river flat through which the various distributaries of the Tasman ramify is about 4 miles wide, on either side of which low morainic hills stretch to the base of the mountains—the broken Leibig range on the north-east, and the rugged slopes of the Ben Ohau range on the west.

THE KARANGAMA RIVER.

From 4 to 6 miles below the terminal face of the Tasman glacier the Tasman river receives the distributaries of the Hooker river—a wild turbulent stream formed by the union of the water from the Hooker and Mueller glaciers. Lake Pukaki, which has a length from north to south of 8 miles, and a width in the opposite direction of $3\frac{1}{2}$ miles, had formerly a much greater northward extension, its basin having been filled by the masses of *débris* brought down by the Tasman river. The outlet of Lake Pukaki is by the Pukaki river at its extreme south-western corner, where the river flows through thick masses of the terminal moraines deposited by the ancient Tasman glaciers. Lake Pukaki owes its origin to the damming by these moraines of the broad Tasman trough, probably formed by glacial planing along a pre-existing

river channel. Many phenomena testify to the former great extension of the Tasman glacier—the terminal and lateral moraines spreading far out on to the Mackenzie and Upper Waitaki plains; the ancient glacial terraces deposited on the slopes of the Ben Ohau and Leibig ranges, the highest of these being probably about 1500 feet above Lake Pukaki, but farther north occurring at greater altitudes; and the steep generally smooth lower slopes of the bordering ranges, especially towards the present terminal face of the Tasman glacier. The differences of level between the lateral moraines of the ancient Tasman glacier is a somewhat remarkable feature.

### *The Tasman Glacier Proper.*

The Tasman glacier, which is longer than any single glacier in the Swiss Alps, though now vastly inferior in size to its former magnificent proportions, is still a very splendid ice-stream. In its lower reaches it is bordered by the Leibig range on the east, and by lesser peaks of the Mount Cook range on the west. Above the entrance of the Murchison the rugged snow-clad slopes of the Malte Brun range and Mount Darwin on the east, and the stately peaks of the island divide and Mount Cook on the west, surround the great glacier. From the east the most prominent entering stream is the Murchison. The terminal face of the Murchison glacier is about $1\frac{1}{2}$ miles above the junction with the Tasman, and most of the water which flows from it continues down along the eastern side of the Tasman ice and enters the river just below the snout of the Tasman glacier.

The Darwin glacier flows into the Tasman from the east, between Mount Malte Brun and Mount Darwin. The largest tributary glaciers entering from the west are the Ball, Hochstetter, Haast, and Kron Prinz Rudolf, which flow from spacious snow-fields amid the mighty peaks of the island divide. These glaciers will be described later. Towards the lower part of the Tasman glacier numerous small streams of water descend in abrupt waterfalls from small U-shaped hanging valleys perched high on the mountain-sides. They flow from ice-blocks on the Leibig and Mount Cook ranges, and probably entered the Tasman glacier with an even gradient during the period of its maximum extension.

The Hochstetter Dom has a very steep descent to the Whymper glacier, at the head of the Wataroa river, which flows to the west coast, but a comparatively gradual inclination to the Tasman glacier on the eastern side of the Alps. Below the huge bergschrund, which almost completely engirdles the summit of the Hochstetter Dom, the ice of the upper part of the glacier is remarkably smooth for about 4 miles, where crevasses disposed almost at right angles to the course of the glacier first become prominent, and from here thickly seam the ice for 4 or 5 miles. In the lower part of the glacier, where the moraines completely shroud the ice, crevasses are not especially evident, though the surface of the

ice, in ridges, hummocks, and hollows, is extremely uneven. The deep blue pools and glistening walled "moulins," which are common, especially in the middle and lower parts of the Tasman glacier, are very charming features. On the western side of the Tasman glacier, for some 6 miles above its terminal face, or as far as the entrance of the Ball glacier, appears a deep boulder-strewn trough, between the lateral moraine of the present Tasman glacier and the smoothed slope of the Mount Cook range, which formerly formed the border of the glacier. At intervals along this curious trough, boulder fans enter from the slopes of the Mount Cook range. These in some places dam back small ponds of water issuing as springs from beneath the lateral moraine,

FRANZ JOSEF GLACIER, FROM THE LOWER RIDGES ON ITS SOUTHERN BORDER.

which is often 165 feet in height. Several of these situated near the terminal face of the glacier are of exquisite beauty, the water, of a rich blue colour, being surrounded by thick alpine scrub and gay alpine flowers.

The lower 5 or 6 miles of the Tasman glacier are entirely moraine-covered; the upper 3 or 4 miles are apparently almost free from moraine, and the intervening space shows an increasing amount of moraine towards the terminal face. Lithologically, the morainic material consists entirely of grauwacke and argillite, of which rocks interstratified the adjoining mountains are composed. The morainic material is of all sizes, from fine powder to blocks weighing hundreds of tons. Some of the coarsest *débris* is that brought down by the Kron Prinz Rudolf glacier. Striated pebbles and boulders are comparatively rare, the rocks being on the

whole too soft to retain the scratches well. The boulders are mostly angular or sub-angular, but occasionally are rounded by abrasion with other boulders in the englacial streams. In the distribution of the moraines on the surface of the ice, one of the best indices to the movement of the ice may be seen. The lateral moraines brought down by each tributary glacier bend in broad curves, and unite with those of the neighbouring glaciers to form the medial moraines. These, some 5 or 6 miles above the frontal face, are separated by bands of clear ice free from moraine, but nearer the frontal face unite to form the mantle of *débris* which, disposed now in ridges, now in hollows, completely covers the clear ice. The relative increase in the quantity of morainic material on the surface of the ice near the terminal face is chiefly due to the removal by melting of the ice which shrouded the *débris* higher up the glacier.

The eminent Prof. Heim, of Zurich, who visited the Tasman glacier in 1902, mentions that the bordering rocks show no evidence of striation.* This statement, though generally true, is not always correct, as the lower and middle slopes of Mount de la Bêche, composed of hard grauwacke, are exquisitely striated. The water issuing from beneath the snout of the Tasman glacier is heavily charged with rock flour, but this is apparently derived from the comminution of rock fragments within the ice by grinding against one another, rather than as a result of rock excavation. In fact, the modern Tasman glacier is merely a shrunken remnant of a former much greater feature, and it could hardly be expected to be erosive in action, when filling a trough which is more than ample to contain it, and which is apparently the product, as already mentioned, of an ancient great ice advance —in a period of "ice flood."† During this former period there can be no doubt that the glacier was erosive, as evidenced by the broad U-shaped valley in which the Tasman glacier and river now flow. In this broad valley the spurs entering from either side are truncated.

From careful surveys made by Mr. T. N. Brodrick,‡ the Tasman glacier gives no direct evidence of any decided permanent advance or retreat in recent years, though there are naturally minor changes in position depending on the condition of the snowfall. The advance and retreat is much more conspicuously shown in the case of the tributary glaciers of the Tasman. Some slight evidence of a decided advance of the Tasman within recent years is given by the partial demolition of a lateral moraine which borders the glacier on the west. This lateral

* See note, by Dr. A. Heim, p. 18, of the 'First Annual Report of the New Zealand Department of Tourist and Health Resorts.'

† See paper by E. C. Andrews, "The Ice-flood Hypothesis of the New Zealand Sound Basins," *Journal of Geology*, vol. 14, No. 1.

‡ See paper by T. N. Brodrick, district surveyor, on "Ice Motion of the Canterbury Glaciers," in the *New Zealand Alpine Journal*, October, 1894.

moraine is sufficiently old to have become fairly well covered with vegetation. During the summer of 1905—and I understand for some years previous—its eastern side has been gradually undermined. This process may simply indicate a change in the course of the glacier, but from various features seen in the field, this seems hardly probable.

The Ball glacier, which originates on the Mount Cook range near Ball pass, leading to the Hooker glacier, descends at first in a series of ice-falls, and enters the Tasman in a heavily moraine-covered train. It

WESTLAND FOREST.

is remarkable chiefly from the fact that its course is at an angle of about 315° with that of the main glacier. Perhaps there is no finer sight within the limits of the area covered by the Southern Alps than the great Hochstetter ice-fall. This magnificent glacial feature descends nearly 4000 feet, in a great cascade of ice almost three-quarters of a mile in width. The *séracs* of splendid proportions rise in places almost 100 feet in height, separated by yawning crevasses of profound depths. The Hochstetter glacier starts at the edge of the great ice plateau, which is a mile

long by three-quarters of a mile wide, lying at the base of the Linda glacier descending from the slopes of Mount Cook. The Haast glacier, which descends from the *névé* surrounding the mountain of the same name, also exhibits a series of imposing ice-falls. The Kron Prinz Rudolf glacier, originating in the snow-fields around Graham's Saddle, carries much moraine to the main ice-stream. The view obtained from Graham's Saddle, which leads from the Tasman to the great Franz Josef glacier on the Westland side, is one of the best to be had anywhere in the Southern Alps. To the southward, the broad U-shaped strike valley of the Tasman, bordered by lofty glacier-dotted mountains on either side, can be traced for miles; while to the westward the magnificent Franz Josef glacier can be seen to be flowing just below Graham's Saddle, and to descend abruptly between the rugged snow-clad ridges down into the luxuriant verdant forest of Westland, bordering on the Tasman sea, which glimmers in the distance. All around is seen a veritable *mer des montagnes*, the giant peaks of de la Bêche, Haidinger, Haast, and Hector being especially evident, with ever prominent the stately monolith of Mount Cook.

Graham's Saddle is comparatively easily reached from the Tasman glacier. The route passes up the Kron Prinz Rudolf glacier to the base of the ice-fall; then, after traversing a rather serious bergschrund, ascends a long steep couloir on to a steep *arête* leading to Mount de la Bêche. This *arête* is ascended for some hundreds of feet, when a descent is made to a deeply crevassed snow-slope of gradual inclination leading to the elevated col.

### *The Mueller Glacier.*

The Mueller glacier is of a most extraordinarily crooked shape. Near its source it flows almost north-east, while in its lowest reaches its course is to the south-east. It makes a complete turn around the rugged buttress of Mount Ollivier, which marks the northward extension of the Sealy range, a subsidiary ridge to the Ben Ohau range. On the left side the ice-river is bordered mainly by the Moorhouse range, a portion of the island divide, on which stands the splendid serrate peak, Mount Sefton; but near its terminal faces it traverses the Hooker valley and abuts against the base of the long talus slopes from the Mount Cook range. The Mueller glacier is formed by the union of many small ice-streams which flow from the Sealy and Moorhouse ranges bordering it on either side. Some of the most splendid of these descend as magnificent ice-falls from the precipitous flanks of Mount Sefton. Avalanches, generally small, but sometimes of prodigious size, are constantly falling. The upper part of the Mueller glacier is free of moraine, but the lower part is thickly strewn with boulders, many of huge size. These are of grauwacke and argillite, together with various varieties of schist. The surface is much more irregular than that

of the Tasman glacier, rough ridges, sharp pinnacles, and deep hollows being everywhere encountered, while abrupt descents or minor ice-falls occur at several places. The Hooker river, flowing from the glacier of the same name, is strongly deflected by the Mueller glacier, just above its terminal face. The lateral moraines of the Mueller glacier are often of enormous size and remarkable height. Perhaps the largest are those occurring just behind the Hermitage, the Government accommodation house near the terminal face of the glacier. Here several parallel lateral moraines are to be seen, the highest having a local relief of quite 370

MOORHOUSE RANGE.

feet. The outer ridges are clothed with thick alpine forest; then appear in succession ridges with mountain scrub, ridges gay in summer with alpine flowers and grasses, and nearest the ice, ridges of rough, bare morainic *débris*. In times of flood, the water dashes turbidly from beneath the high cliff of ice at the foot of the Mueller with tremendous force, rising geyser-like with the sudden relief of pressure, and carrying large stones down the stream. At times, also, some of the water bursts through the lateral moraines behind the Hermitage, and thus seeks exit to the Hooker river.

### *The Hooker Glacier.*

The Hooker glacier occupies a deep valley between the precipitous slopes of the Mount Cook range and the broken, eastward-facing flanks of the Moorhouse range. It is formed by the union of many glaciers, which descend in huge ice-falls from the ridges on either side; but chiefly from Mount Cook itself and David's Dome—a fine snow-covered mountain which marks the termination of the Mount Cook ridge at the island divide. Like the Tasman, the Hooker occupies a strike valley. It has a length of nearly $7\frac{1}{2}$ miles, and an average width of about half a mile. It is covered with heavy morainic *débris* for $4\frac{1}{2}$ miles from its frontal face. The Hooker is bordered by splendid lateral moraines for many miles up its course. On the eastern side of the glacier opposite Fitzgerald pass, there are no fewer than six of these lateral moraines disposed in terraces, the lowest being on the edge of the present glacier.

Neither the Hooker nor the Mueller glacier shows any decided advance or retreat within recent years, though there have apparently been slight minor changes in the position of the terminal face. The following table,* prepared by Mr. T. N. Brodrick, Surveyor of the New Zealand Government, regarding the Tasman, Hooker, and Mueller glaciers, is of interest:—

| Name of glacier. | Area of glacier. | Area of country from which supply of ice is drawn.† | Length of glacier. | | Average width. | | Greatest width. | | Least width. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | acres. | acres. | mls. | chns. | mls. | chns. | mls. | chns. | mls. | chns. |
| Tasman ... | 13,664 | 25,000 | 18 | 0 | 1 | 15·0 | 2 | 14 | 0 | 50 |
| Mueller ... | 3,200 | 7,740 | 8 | 0 | 0 | 50·0 | 0 | 61 | 0 | 37 |
| Hooker ... | 2,416 | 4,112 | 7 | 25 | 0 | 41·3 | 0 | 54 | 0 | 30 |

### The Valley of the Copland.

From the Hooker glacier a somewhat difficult route leads over Fitzgerald pass, in the Moorhouse range, into the wild and little-explored valley of the Copland. The route leaves the Hooker glacier about 3 miles above its terminal face. First, a long talus slope and couloir is ascended, then a tedious *arête*, leading on to a small ice-field deeply crevassed in several places, and lying just at the base of Fitzgerald pass. The descent to the tree-bordered bed of the Douglas river, the headwaters of the Copland, is first down a long gradual snow-slope, and then down a steep grassy slant bright with alpine flowers. About 5 miles below the western base of Fitzgerald pass the Strauchon river

* See paper on 'Ice Motion of the Canterbury Glaciers,' in the *New Zealand Alpine Journal*, October, 1894.

† It is not the whole watershed, but only that portion on which the snow lies.

joins the Douglas river from the north-east, and together they form the Copland river proper. The united stream, after a course of about 12 miles, joins the Karangarua, and together they flow to the sea, some 10 miles distant. There is a very small glacier, known as the Marchant, at the head of the Douglas river, above the point of descent from Fitzgerald pass, and a larger glacier, known as the Strauchon, at the head of the river of the same name. The Strauchon glacier descends from the base of Baker's saddle, which leads to the Hooker glacier near its head.

The Copland is a river flowing in a channel, which shows typically the influence of ice-action. One sees the U-shaped valley with gently

FOX GLACIER, WESTLAND.

curving moraine-filled floor, the smooth, precipitous enclosing walls of solid rock, and the tributary streamlets entering in marked discordance in grade, and often in steep falls, from valleys perched high above the main river. The scenery of the Copland is beautiful in the extreme. The bright blue water rushes in almost unending rapids in a channel strewn with huge boulders of fantastic shapes. On either side rises a forest of almost tropical splendour, gay in summer with the blood-red flowers of the rata and the rich creamy white blossoms of the hoheria. Above the valley floor, rises abruptly for thousands of feet the great rock walls, to which a scant but brilliant vegetation clings. Back from these precipices rugged ridges clad in alpine vegetation lead to the lofty snow-clad heights which are ever visible against the northern and southern skies, while to the eastward, splendid and

majestic, stand the giants of the Southern Alps—Mount Sefton, the Foot Stool, and others. Now and then one sees, close to the river-side, a waterfall of exquisite beauty break into the forest from altitudes hundreds of feet above, or again, in the distance, one catches a glimpse of some wild unknown glacier descending with wonderful ice-falls from some hidden snow-field in the mountains.

Travelling through the dense Westland forest with its thick matted undergrowth is exceedingly difficult, and walking along the bed of the river is, for the most part, impossible, owing to the numerous waterfalls and the boulders of huge size which strew the stream-bed.

Near Welcome flat, which is situated about halfway down the Copland, between the junction of the Douglas and the Strauchon and the point of union with the Karangarua, on the north bank of the stream there occur rather remarkable hot springs. These springs rise in a small flat-topped mound of brownish sinter, exhibiting miniature terraces. The plateau is surrounded by a luxuriant growth of tree fern, New Zealand flax, etc., while close at hand is a cave beneath an immense erratic, apparently but slightly removed from its original position, at the base of which a spring heavily charged with hydrogen sulphide occurs. The springs issuing in the sinter plateau are at a high temperature, but below the boiling-point.

The Copland resembles many another river of the west coast, which flows turbulently through this charming southern *terra incognita*.

### The Franz Josef Glacier.

The Franz Josef glacier, in which the Waiho river rises, lies some 25 miles north of the Copland. The Franz Josef originates in a great field of *névé* lying near the base of Graham's saddle. Between Graham's saddle and Fitzgerald pass many splendid glaciers descend from extensive ice-fields which feed wild rapid rivers rushing to the Tasman sea. Perhaps the most prominent of these ice-streams are the Balfour and the Fox. The latter, a glacier of magnificent proportions, is unknown to the writer, but is said to originate in the most spacious and splendid snow-field to be found in the New Zealand Alps, not excepting the Tasman itself.

The great Franz Josef glacier forms one of the most wonderful and beautiful sights in New Zealand, and perhaps in the world. On reaching this glacier by way of the track which passes through the Westland forest and which is at present the sole highway through the wilderness, one is struck with amazement at the marvellous characteristics of this extraordinary ice-river. From this point, just below the terminal face, practically its entire course can be seen from where it originates high up on the slopes of Mount de la Bêche and the Minarets. Its gently curving course can be traced for the 8½ miles in which it descends over 8000 feet from a region of perpetual snow to its terminal face

UPPER TASMAN GLACIER.

—within 700 feet of sea-level, where its snout, a cliff of ice nearly 100 feet high and half a mile wide, is bordered on either side by a orest of rare beauty and of subtropical luxuriance and splendour. Here and there a waterfall leaps hundreds of feet from the mountain-sides on to the surface of the ice. The contrasts in the *ensemble* are amazing. From beneath the shade of a tree-fern or a mountain cabbage-tree, on an old lateral moraine of the glacier, one may look upon the much *séraced* and pinnacled clear ice of the glacier, and up on a gorgeous array of snow-clad peaks.

The surface of the Franz Josef glacier, for all of the lower 5½ miles of its course, is exceeding rough, and is practically a continuous ice-fall —a maze of *séracs* and aiguilles, between which are deep crevasses and caverns. Compared with the glaciers on the eastern side of the Alps, the amount of moraine carried by the west coast glacier is in general remarkably small. This is apparently due partly to a much more abrupt descent of the Westland glaciers than those flowing to the east coast—a feature which gives a proportionately more rapid rate of flow and a consequently quicker removal of the waste material. It is also certainly due in part to a difference in the composition of the rocks on either side through which the ice-rivers flow. For instance, the upper part of the Franz Josef glacier is bordered by argillites and grauwackes, which continue to the eastward. The argillites easily disintegrate, and in disintegrating carry the interstratified grauwackes with them down the slopes. The lower part of the Franz Josef flows through hard schists of varied petrological composition, which do not decompose nearly so rapidly as the argillites. Thus while the principal west coast glaciers flow partly through hard rocks and partly through easily decomposed rocks, the east coast flowing glaciers around Mount Cook pass only through rapidly disintegrating strata. West coast glaciers, which flow only through the softer upper rocks, have a much greater proportionate amount of moraine than those which traverse the harder lower series of rocks as well. A good example of a west coast glacier, carrying much moraine, but flowing only through the easily decomposed strata, is the Strauchon, a tributary of the Copland river.

Glaciated surfaces * are beautifully apparent along the west coast glaciers. One sees well-polished rock walls, exquisitely smoothed *roches moutonnées*, abundant glacial scratching and gouging on the solid rock surfaces, and striæ on the morainic boulders. Most of this smoothing, striation, etc., is the result of past glaciation, and owes its excellent preservation to the hard nature of the rocks. Some of it, however, is apparently of modern origin, as striations at the very border

* See paper by Geo. Carrol Curtis in *Bulletin of the American Geographical Society*, February, 1906.

FOX GLACIER, SHOWING THE STRATIFIED ICE.

PINNACLED ICE OF THE FOX GLACIER.

of the ice and the many striated morainic boulders carried by the ice seem to testify. It seems probable, however, that glacial excavation at present is of very minor moment as compared with erosion due to this cause in the past. The movement of most of the west coast glaciers, for reasons already stated, is in general apparently much more rapid than on the east coast. Very little data is at present obtainable as to the exact rates of flow. Some years ago, during a reconnaissance survey of the Upper Waiho country, measurements were made of the rate of flow of the Franz Josef glacier by Messrs. G. E. Douglas and A. Harper, of the New Zealand Lands and Survey Department. Lines of rods were laid across the surface of the glacier; some showed a movement of as much as 200 inches per day, diminishing in others to 158, 132, 102, and down to 5 inches per day.* Such very rapid ice-movement is seen in very few places outside of the Arctic Regions.

The terminal face of the Franz Josef glacier has apparently advanced a few hundred feet within the last few years. This is apparently merely a local variation, due to the heavy snowfalls within recent years. In 1898, according to Mr. C. E. Douglas, the glacier was retreating.†

As the Baron von Hochstetter remarked, one would have to travel as far north as lat. 67° in northern Norway to see glaciers descend to so low a level as the Franz Josef glacier, which is in lat. 43° 35° S. of the equator. Even on the east coast the terminal face of the Tasman glacier stands only 2355 feet above sea-level—much lower than any of the Swiss glaciers at latitudes more remote from the equator. Practically, all mountains in the area now being described which rise above 7000 feet are covered with perpetual snow, and there are fair-sized snow-fields at even lower altitudes. The depression‡ of the snow-level in New Zealand is apparently due in part to the disposition of a mountain chain at right angles to the direction of the prevailing moisture-laden wind, and in part to a moist climate, exhibiting a very small range of temperature.

Very little has been certainly or accurately ascertained as to the structure and main glacial characteristics of the heart of the Southern Alps. Many of the highest peaks are unscaled, numerous lofty passes untraversed; comparatively little is known about the wide extent of its snow-fields, the movements of its glaciers, and the peculiarities of its marvellous scenery. There are few areas which present such a wide field for varied exploration.

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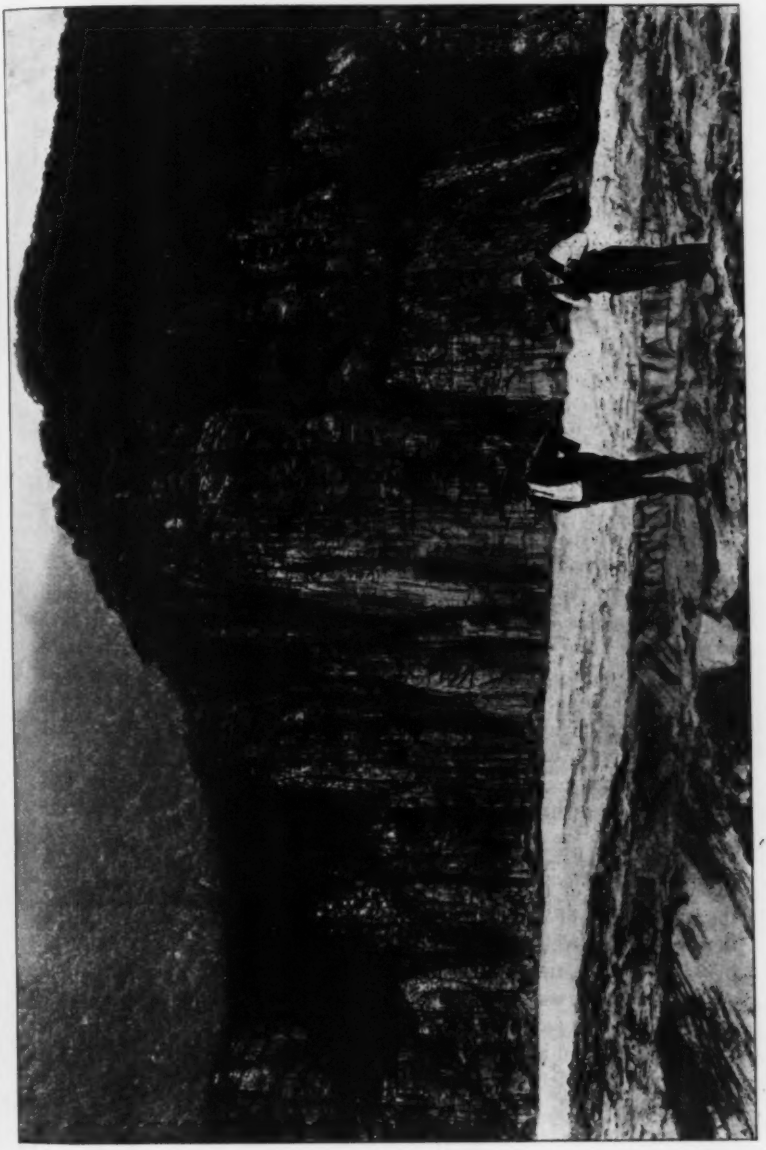
* See 'Land and Survey Report, 1894,' p. 77 and diagram.

† See 'Report of the Department of Lands and Survey, New Zealand, 1897–1898,' p. 118.

‡ See also "Climatic Features of the Pleistocene Age," by Prof. Albrecht Penck, in the *Geographical Journal*, vol. 27, No. 2, p. 183.



POLISHED ROCK SURFACE, FOOT OF FOX GLACIER.

## RESEARCH DEPARTMENT: THE WORK OF THE PAST SEASON.*

By Major C. F. CLOSE, C.M.G., R.E., Chairman.

During the past year the following investigations have been carried out at the instance of the Research Committee: (1) An investigation into the changes which have taken place in the eastern coast-line of England. A bibliography has been prepared by Mr. T. Sheppard of the Hull Museum. (2) An investigation into the amount of matter in suspension in rivers. This work is being carried out by Dr. Strahan; so far £70 has been spent on it. During the past year, also, the Council of the Society, on the recommendation of the Research Committee, has approved the offer of a grant of £100 a year for four years towards the measurement of $2\frac{1}{2}$ degrees of arc of the 30th meridian in Uganda. Grants towards this measurement have also been promised by the Royal Society, the Royal Astronomical Society, and the British Association. A committee composed of the President R.G.S., Sir G. Darwin, and Sir D. Gill have approached the Colonial Office on the subject, and it is understood that the Colonial Office regard the project favourably. It is certainly very desirable that the present opportunity of carrying out this important measurement should not be lost.

As regards the investigation of the East Coast changes, the Council inquired from the Royal Commission as to when their report might be expected, as there was some reason to fear that the Society's investigations might be superfluous. It was ascertained that it will be at least a year, if not more, before anything is published, and in the mean time the excellent bibliography by Mr. Sheppard is work of a character not attempted by the Royal Commission.

On the more general question of the functions of the Research Committee, it is clear that we should direct our attention to definite scientific ends, and leave the more popular side of geography to evening meetings. There are many branches of study which deserve the attention of the committee, but of these I will only mention four, viz. physiography, the application of geographical study to history, geodesy, and the theory of map-making. Taking physiography in its rigorous sense as the science which treats of the Earth's physical features, their formation and modification, we have an excellent example of a physiographical investigation in a paper given us by Dr. Woolacott on the physiography of Northumberland and Durham. In this study geography joins hands with geology; in fact, research of this character is impossible without the aid of geology.

As regards the second subject in my list, the application of geography to history, there is an excellent recent example of this in the

* Research Department, Annual Meeting, June 21, 1907.

examination carried out by Mr. Baring and General Renouard James into the Battle of Hastings. A detailed examination of the topography of the site of the battle has made it necessary to modify previous accepted conclusions, and strengthens the theory that the English and Norman armies were each only about 10,000 strong.

The third subject, geodesy, opens up a very wide field. It is wise of the Society to take geodesy under its wing, for it has no home elsewhere. On one side of course it is allied with astronomy, on the other with geology, but it is a science in itself which demands little less than the application of a lifetime. I may perhaps mention a matter which was told me by Dr. Teall the other day, *i.e.* that it has been suggested by Mr. James that the abnormal variation in local attraction in Banff should be examined with a view to ascertaining whether there are any metalliferous deposits near the surface. An examination of this nature is chiefly expensive because it costs *time*, and when observers have to be paid, the cost may easily mount up to some thousands of pounds. If, however, competent volunteers could be found, the cost would be insignificant. The investigation would be an exceedingly interesting one, and it would, moreover, be new. A thorough detailed geodetic examination of a limited area, say 4000 square miles, has never yet, I believe, been undertaken.

On the fourth subject, the theory or philosophy of map-making, a very interesting note appeared in the June number of the *Geographical Journal*, giving an account of the determination of the projective effect of colour-codes for maps by Dr. Brückner. It is a subject which has not yet received the attention which it deserves, and it is one which lends itself to experiment, and might very well be taken up.

I have mentioned these instances of some classes of useful research, partly to emphasize the fact that all research should be of a scientific character, but also partly to make it clear that in most cases it is not reasonable to expect that useful work will be done by busy men in spare moments of time. This sort of work is essentially for young men who can apply themselves definitely to research, and especially, I would suggest, for those who study in the schools of geography at Oxford and Cambridge.

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## REVIEWS.

### EUROPE.

#### Structural Geography of Iceland.

Th. Thoroddsen, 'Island: Grundriss der Geographie und Geologie.' *Petermanns Mitteilungen*, Ergänzungsheft, No. 152, 1905, pp. 161, 1 map; and No. 153, 1906, pp. 358, 2 plates. Gotha: Justus Perthes. 22 *marks*.

Iceland is of special interest to British geographers, as it is the largest and most instructive volcanic area in Europe, and it was built by the same series of eruptions

as that which gave the western isles of Scotland some of their most conspicuous features. It has been studied by a succession of distinguished geographers and geologists, of whom the recognized authority on the island is Prof. Thoroddsen of Copenhagen. He visited it every year from 1881 to 1898, and has now summarized the results of his prolonged observations in a monograph on its geographical and geological structure.

Iceland consists essentially of a dissected volcanic plateau. It has an area of 104,785 square kilometres. Its foundation is a platform of basalt that rises in a plateau from 500 to 1000 metres high, above which smaller plateaus rise to the height of 1400 to 2000 metres. It is almost entirely composed of volcanic rocks, the exceptions being a small patch of gabbro on the south-eastern coast, some sedimentary deposits containing beds of lignite, and a patch of Pliocene shell beds of the same age as the English Red Crag. The basalt sheets that form the base of the island have been discharged in a succession of flows, which form a series 3000 metres in thickness, although the base is not seen. The basalts outcrop over half the surface of the island, most of the rest of which is covered by volcanic tuffs. Iceland belongs to the same volcanic province as the northern parts of the British isles, and its basalt series once extended to Greenland and Scotland. Iceland was part of a volcanic plateau the area of which was several hundred thousand square kilometres. This land existed last in Miocene times. It was broken up in the Pliocene by great earth-movements, by which the land around Iceland foundered beneath the sea. Iceland was thus left as an isolated earth block, which stood 250 metres higher above the sea surface than it does to-day. The island was also larger, as it extended on all sides for from 50 to 100 kilometres beyond its present coasts. The platform bounded by the 100-fathom line was then land, and was being cut through by valleys which still exist and are recognized by sounding. Dr. Thoroddsen denies the view, advanced by some botanists, that Iceland was connected by land with Europe in Pliocene or post-Glacial times. Pliocene erosion carved the Icelandic valleys, which Dr. Thoroddsen tells us existed essentially, as at present, before the beginning of the Glacial episode. The position of the valleys was largely determined by earlier earth-movements, while their contours have been moulded by the flow of the glaciers down them. The Icelandic valleys include several rift-valleys and two groups of fiords. The fiords are confined to the basalt areas in the north-western part of the island, and their origin has been long discussed. Dr. Thoroddsen summarizes the previous literature, and expresses his own conclusion that they are pre-Glacial valleys due to ordinary river-erosion, which have subsequently been enlarged by glaciers.

In contrast to the fiords are the broad bight-like bays on the coast, which are due solely to earth-movements, where blocks of the Earth's crust have foundered beneath the sea. The earth-movements began in late Miocene times, and are still in progress. Iceland shows evidence of great changes of level in reference to the sea surface. At the beginning of the great glacial advance the land was 100 metres lower than it is now. It subsequently rose 80 metres above the present level, but then sank, after a long rest at the 40-metre stage, to the existing level.

Of the Icelandic lakes, some are due to glacier dams, and some to water from melting glaciers collecting in hollows. Others occupy basins made by volcanic explosions, while the largest and most important lakes are of tectonic origin. The largest, Thingvallavatn, of 105 square kilometres and a depth of 111 metres, is due to direct earth-movements, as its south-western shore is part of a long fault scarp. The second largest, Lake Thorisvatn, has an area of 100 square kilometres, and occupies a basin formed by subsidence in an area of volcanic tuffs.

The glaciers are fully described. It appears that one of them only just misses

reaching the sea, as the snout of that at Breidamerk flowed, in 1904, down to only 9 metres above sea-level.

The volcanoes of Iceland have been the feature of most general geographical interest in the past. According to Dr. Thoroddsen, their chief characteristic is the discharge of great lava-masses through fissures, and without the formation of craters. The Icelandic volcanoes have, therefore, played an important part in the discussion of fissure eruptions.

The profound direct effects of faults on the topography of Iceland is well shown in Dr. Thoroddsen's description of its structure. This instructive monograph will doubtless take its place as the standard work on Icelandic geography, as it is the result of an almost lifelong study, made by a man whose writings impress on his readers confidence in his insight and judgment. J. W. G.

## ASIA.

### Indian Records.

Indian Record Series. 'Old Fort William in Bengal: A Selection of Official Documents dealing with its History.' Edited by the late C. R. Wilson, M.A., D.LITT. 2 vols. London: Murray. 1906. Pp. xl.–256, vii.–330. Size 9½ × 6¼. *Price* 24*s. net.*

Fort William, in Bengal, should ever live in the memory of Englishmen as the scene of the tragedy of the Black Hole on the night of June 20, 1756. The actual position of the prison was for long uncertain, but Dr. Wilson's investigations have cleared up the matter, and the site has now been preserved, and the position of the buildings, fortifications, etc., marked. This satisfactory result is in great measure due to the zeal of Lord Curzon, who took an active interest in Dr. Wilson's excavations. As an introduction to these volumes are printed Dr. Wilson's account of his work on the site, a description of the means taken to preserve and record the position of the different buildings, and an account of the ceremony at the unveiling of the monument to the memory of those who perished in the Black Hole, the monument being, as far as possible, a replica of that erected by Holwell, which was stupidly destroyed at the beginning of the last century.

The book proper consists of a selection of documents bearing on the history of the settlement. These consist principally of reports from the officers to the Board of Governors, and are of great interest and importance, and will be of considerable service to the historian and others working on the history of India. In addition to the contemporary documents, several articles bearing on the excavations have been reprinted from modern journals and newspapers. There are some excellent plans and illustrations of the old fort, and photographs of those parts which either still remain or have only recently been destroyed. There is also a good index.

Dr. Wilson has done his work well, and it is a matter for regret that he did not live to see the publication of his important book.

### Early Enterprise in India.

'The English Factories in India, 1618–1621: A Calendar of Documents in the India Office, British Museum, and Public Record Office.' By William Foster. Oxford: Clarendon Press. 1906. Pp. xlvii.–379. Size 9 × 6. *Price* 12*s.* 6*d. net.*

This book is one for the historian rather than the general reader, being a calendar of the papers of the East India Company between the years 1618 and 1621, when there were but five English factories in the dominions of the Great Mogul. Where the papers are of peculiar importance or interest, Mr. Foster quotes them in full, but in other cases merely a *résumé* of their contents is given, this

method being that recommended by the Historical Manuscripts Commission. The documents have a very living interest, and show in a vivid manner the troubles and difficulties of the early traders, not only with the native rulers, but also with the other European trading companies, especially in connection with the attempt made by Sir Thomas Roe to revive the Red sea trade. Mr. Foster has added a useful introduction, in which he condenses the history of these three years, giving references to the original documents printed in the body of the book. The work, which must have been a laborious task, is well done, and Mr. Foster has laid under a debt of gratitude all persons working at the history of our early occupation of India.

### The Santal Parganas.

'The Story of an Indian Upland.' By F. B. Bradley-Birt, B.A., I.C.S. London: Smith Elder. 1905. Size 9 × 5½, pp. xiv. and 354. *Price* 12*s.* 6*d. net.*

Mr. Bradley-Birt, who is already well known by his book on Chota Nagpur, has in this volume undertaken the task of describing one of the most interesting districts of India, the Santal Parganas, and he has met with great success. Fascinated with the glamour of the East, and writing in a fluent and easy style, Mr. Bradley-Birt has produced a most vivid and entertaining narrative.

Where the Ganges takes its big southerly bend rise the Rajmahal hills, and in these hills live an aboriginal Dravidian people—the Paharias. Pushed by pressure from the west until they were brought to a stand in what has been called this *cul de sac*, the Paharias have dwelt for centuries among these mountain fastnesses, supporting themselves by raiding the plains, and from their hills have seen the Hindu and Mussulman empires wax and wane, leaving them uncontaminated and untamed. It was not until the advent of the British Raj that they were brought into some subjection, and the change was due to the genius of a young Englishman, Augustus Cleveland. Cleveland, who had a rare sympathy with the people, and who was only twenty-nine when he died, so arranged matters that the Paharias were left in possession of their hills, and a district at the foot, the Daman-i-koh, was also assigned to them. But the Paharias were afraid to leave their homes, and consequently these spurs of the hills were left unoccupied until the coming of the Santals, another aboriginal people, who, with a perfect genius for agriculture, soon turned what had been waste jungle into smiling fields.

Such are the people of whom Mr. Bradley-Birt writes, of their mode of life, their religion, their feasts and ceremonies, and he also adds a chapter on Deoghar, the sacred city of the Hindus, the home of Siva. The book is a model of what such books should be—a vivid narrative, well written, and full of sympathy for the subject with which it deals.

## AFRICA.

### Speculative Ethnology.

'The Origin of the Bantu: a Preliminary Study.' By I. F. van Oordt, B.A. Cape Town: Official Publication of the Cape Government. 1907.

Mr. van Oordt argues in this work that the Bantu languages owe their origin to the invasion—to two invasions (in about 1300 B.C. and 680 B.C.)—of North-East Africa by a "Sumerian" people from Mesopotamia, who introduced a "Ugro-Altaic" type of language into Negro Africa; in fact, the mother tongue of the Bantu. The Hottentots, Mr. van Oordt contends, are related anciently, not only in race but in language, with the Negrito Semang of the Malay peninsula. The Semang and the Sakai he believes to be related in language with the Mon-Annam, the Tibetan, Dravidian, and Ugro-Altaic peoples. The first of his

Bantu invasions (placed by him theoretically in about 1300 B.C.) brought into North-East Africa a Dravidian rather than an "Ugro-Altaic" element (linguistically), though, as the one (in his opinion) is fundamentally related to the other, this fact does not modify his general conclusion (p. 24), that the Bantu languages and those of the Ugro-Altaic race sprang from one common stock some 7000 years ago. (Mr. van Oordt elsewhere suggests that the immediate ancestors of the Bantu did not enter Africa, when they came "*by sea*," till about 3200 years ago; but several of his statements are mutually contradictory.)

Not content with this bold thesis, he carries his readers on to the "Malacca peninsula," where he believes "we shall find the origin of the Bantu." He then gives a comparative table of eight pages to show the supposed resemblances between word-roots in *Semang*, *Sakai*, and *Jakun* (Skeat and Blagden are his authorities for these citations), and roots of similar meaning in *Bantu* languages. Also other tables to show correspondence between roots in *Hottentot* and *Semang*; between *Bantu* and *Dravidian* tongues; and between *Shuna* (of Mashonaland) and *Assyrian*.

It is sufficient to say that these tables prove *nothing*, certainly lend no weight to Mr. van Oordt's speculations; do not, for example, prove that there is any marked resemblance or connection in syntax or word-roots between any set of Asiatic languages (except the half-African Semitic) and any group of African tongues, such as there is—marvellous to relate—between the Malagasy dialects and the speech of Polynesia. It is this staggering fact of the colonization of Madagascar from Sumatra or Java, across the Indian ocean, without contact with Africa, that alone excuses such wild theorizing as that of Mr. van Oordt. But he can give no proof to satisfy a trained philologist that the Bantu languages came from Asia, or that Hottentots and the Negritos of the Malay peninsula (after possibly a hundred thousand years of divergence from a common centre of origin) still maintain any linguistic connection. It should be added that the Bantu words and their etymologies quoted in this work are often misleading. Mr. van Oordt persistently mixes up the separable, changeable Bantu prefix with the actual word-root; and he cites, by some misapprehension, words which do not exist, or words borrowed from Arabic or Portuguese.

Incidentally, his bluebook is interesting because of the large number of Bantu languages illustrated (and some of them quite correctly), but it is a dangerous work for the uninitiated. It is disagreeable to have to write thus disparagingly of an Afrikander's work in African philology. I can only hope that Mr. van Oordt, so far from being discouraged by criticism, will take advantage of his position and residence in South Africa to give himself up to *detail* work, which is badly needed. Let him undertake researches into Shi-shuna, into the dialectal differences of the Kafir speech, into the North Kalahari language-field or the scarcely known idiom of the Berg Damara. Then the present writer will be amongst the readiest to thank him.

The fact is, it is sheer waste of time speculating on the non-African origin of the Bantu languages. This group is as much African as the Fula, Mandingo, lower Niger, Nyamnyam, and Nilotic language-families, with which it possesses features of fundamental relationship. What we now want from National South Africa is sound, first-hand research, not useless theorizing: work like that accomplished by Sir George Grey, Dr. Livingstone, W. G. Palgrave, F. W. Kolbe, and Dr. W. H. T. Bleek; and of late by the French, Swiss, and London Missionary Societies' pastors in South Africa.

H. H. JOHNSTON.

### The Herero and their Land.

'Die Herero.' Ein Beitrag zur Landes- Volks- und Missionskunde von Missionar I. Irle. 56 *Illustrations and* 1 *Map.* Gütersloh: C. Bertelsmann, 1906.

Herr Irle, who was a member of the Rhenish mission in Damaraland from 1869 to 1903, has given in 'Die Herero' a very useful summary account of the country in which he lived and the people among whom he laboured. In methodical German fashion the volume is divided into many sections and subsections, and a capitulation of the more important sections will best indicate the nature of the book. A short historical sketch from the time of the Portuguese discoveries is followed by a fairly detailed survey of the orographical and hydrographical features of the country, its climate, flora, and fauna. Having thus dealt with the land, Herr Irle next describes, at considerably greater length, the people; their origin, character, language, religion, family, and social life, and their culture generally. For information on all these points we are greatly indebted to the patient and painstaking research of the Rhenish missionaries, continued for over sixty years. The Herero, it may be noted, are classed as of ancient Bantu stock, as emigrants from the upper Zambezi, and as allied to the Ba-Lunda people. Chapters are also devoted to the "Hill Damara" and to the Bushmen. Next comes a narrative of the wars between the Herero and the Namaquas, and a record of the quasi-protectorate exercised by Britain through the Cape Government. Herr Irle points out the wholly legitimate character of this British protectorate, and shows that Germany only stepped in when England abandoned the field. The text of the treaty concluded between the Herero and the Germans in 1885 is given; a treaty which the Herero, who had no intention of alienating their land, did not fully understand. The relations of the Germans with the Herero up to 1904 are set forth, and though no account of the war which has devastated German South-West Africa is given, it will be seen that 'Die Herero' contains the information needed to enable a judgment on the causes of that conflict to be formed. An "Epoch Calendar" from 1820 to 1902 closes the first part of the book. The second part is devoted to the record of mission work, and demonstrates how completely the Herero are indebted to the missionaries for such advances as they have made in civilization. A simple sketch-map of Central Damaraland on a scale of 1 : 800,000 is given, and the illustrations, though roughly reproduced, illuminate the text.

F. R. C.

## AUSTRALASIA AND PACIFIC ISLANDS.

### The Bismarck Archipelago.

Neu-Mecklenburg (Bismarck-Archipel): Die Küste von Umuddu bis Kap St. George.' Von Dr. Emil Stephan und Dr. Fritz Graebner. Mit 10 Tafeln, 3 Noten-Beilagen, Zahlreichen Abbildungen und einer Uebersichtskarte. Berlin: D. Reimer (E. Vohsen). 1907. *Price* 12 *marks.*

This copiously illustrated little book gives an account of an investigation by Dr. E. Stephan, a naval staff doctor, of the coastal peoples of the southern extremity of New Ireland. It gives a good account of the material life of various tribes, the details of the construction of their houses and canoes being elucidated by detailed sketches, and the native names of the parts are given. The most original and important of his observations deal with decorative art. The account of social conditions is very slight, and adds but little to what was previously known to occur throughout Melenesia generally; there is a dual division of each community, which has a bird for its emblem. "The children belong to the totem of the mother, that is to say, 'Mutterrecht' obtains." No details are given concerning "totemism."

The classificatory system of kinship occurs, but no examples are given as to how it works out. No fresh light is cast upon the Dukduk secret society. Anthropometrical data are given of three individuals. A novel and interesting feature is a list of the people and their possessions (house, canoe, gardens, palms, pigs, fowls, dogs, and the like) in two villages. This idea might be copied and extended with advantage by other investigators. The essay by Dr. Graebner on the ethnographical position of the area in question is of considerable value; he is well qualified for the task, having recently published a valuable paper on "Culture Areas and Culture Layers in Oceania" (*Zeitschr. für Ethnologie*, 1905). By means of the map of distributions which he has compiled, one can see at a glance many of the affinities of the region in question. Maps of this kind afford a useful means of taking stock of our existing knowledge, and serve to give coherence to scattered observations.

A. C. Haddon.

## South Sea Art.

'Südseekunst. Beiträge zur Kunst des Bismarck-Archipels und zur Urgeschichte der Kunst überhaupt.' Von Dr. Emil Stephan. Berlin: D. Reimer (E. Vohsen). 1907. *Price* 6 *marks*.

Dr. Stephan's book has a double value to students. In the first place, it is the record of a careful investigator who gives us full and accurate representations of objects from definite localities in Southern New Ireland, and the meaning of their decoration; though even he admits that "among the explanations to the plates are a number of native names the meaning of which can be made out only imperfectly, or not at all, as well as many patterns the native names of which could not be discovered." In the second place, it is evident from his remarks how unsatisfactory it is for students at home to attempt to elucidate native designs without first-hand knowledge. Among the many interesting facts discovered by Dr. Stephan, we may note that the most important animals, the dog and the pig, are never represented in art. Birds are extremely frequent, especially the frigate bird. Human representations are common, but the sex element is almost entirely lacking, and woman herself and all that relates to her sex are altogether absent. Heavenly bodies are rarely depicted, but other phenomena receive a most unusual attention. For instance, on two boats phosphorescent waves are painted, and common on bamboo boxes are conventional engravings of landscapes, still deep water, rain over sea which is stirred by a gentle wind, and stormy sea and rocks when the seething water is tossed on high.

In the essay on the æsthetics of the Bismarck islanders we have the general conclusions of a field-worker. His remarks on his own area must carry weight, but some of his comparisons with other fields may require reconsideration. It is possible that, had time permitted him to gain a deeper insight into the social groupings and the magical and religious ideas of the people under consideration, he would have found a significance which has so often eluded him. We may allow that there is no profundity in the artistic representations of these people, but that is quite different from denying that there may be a depth of significance greater than their "face-value." Our knowledge of the art of other peoples certainly permits us to expect that this will probably be found to be the case here also. The closing remarks of this valuable contribution to ethnography form an earnest appeal for further investigation by the German Government. The author also rightly says, "Instead of collections, let observations be our watchword, for books of careful notes are a far more valuable production of travel than great cases full of hastily collected objects."

A. C. Haddon.

## GENERAL.

### Surveying.

'Topographie Pratique de Reconnaissance et d'Exploration.' By E. de Larminat. 2nd edit. Paris: Henri Charles-Lavauzelle, 10, Rue Danton, Boulevard Saint Germain 118.

In this book M. de Larminat attempts the difficult task of supplying technical information in popular form. The publication of a second edition shows that his efforts have been appreciated. His preface dedicates his book to officers of the French army serving in the colonies; and he appeals to them to fill in their spare time by taking up sketching as a profitable and fascinating pursuit. Away with the notion, says he, that topography is solely a matter for experts. Every officer is equipped with sufficient elementary knowledge of the subject to be able to do most useful work, if given some practical hints—and here they are. Radiating encouragement by his own evident enthusiasm for the work, and banishing dulness by a charming style, M. de Larminat lures his disciples on to the heavier matters of understanding by a preliminary discourse on the correspondences between geological structure and topographical form. Then follow chapters dealing with compass sketching, triangulation, and field astronomy.

Generally speaking, the methods adopted are similar to those given in English and American text-books, with special reference to the patterns of French instruments. Calculation is as far as possible reduced to a minimum by the use of graphic method diagrams. Of the instruments dealt with, the compass and theodolite do not appear to be such good patterns as ours, nor is the plane-table given, perhaps, the attention it merits. The use of inaccurate instruments obliges the author to deal at length with methods of adjusting closing errors; and a fair criticism may be made that the labour so involved would be better devoted to obtaining more accurate work in the first instance. It must, however, be allowed that beginners are less likely to take up a study as a recreation which at first sight appears laborious; whereas, once committed to it, the interest excited will carry them through equal labours later on.

There is much of interest in this book; but on the whole, English officers and travellers with opportunities for topographical work before them, are already adequately equipped with handbooks in the present military text-books on the subject and the 'Hints to Travellers.'

Perhaps, however, there is an opening for a popular exposition of those same methods written with a view to attract recruits, a book where the asperities of scientific language are softened by a chatty style, and a pervading sympathy with a beginner's difficulties. To wield at once the wands of science and literary art is a *tour de force*; and those who aspire to do this cannot do better than study this work by M. de Larminat.

E. P. B.

### A New Text-book.

'The Oxford Geographies.' Vol. iii., Senior. By A. J. and F. D. Herbertson. Oxford: Clarendon Press. 1907. Pp. viii. + 363. *With maps and diagrams. Price* 2*s.* 6*d.*

As the first two volumes of this capital series were reviewed at some length in the May issue of the *Journal*, a brief notice of the third and last book will suffice to indicate its position in the triple scheme. The first book was mainly descriptive, the second more definitely causal in its treatment of the different regions of the globe; this combines both systems, with a very strong emphasis on the second. The idea is to carry school geography up to a point at which university work may

profitably begin. The main drawback that we noticed in vols. i. and ii., viz. the "stiffness" of subject-matter and diction, in the nature of things vanishes in vol. iii., and we have a book well adapted either for teachers' study or students' examination. Assuming that their readers already possess some concrete knowledge of the world as a whole—no perfunctory assumption by any manner of means—Dr. and Mrs. Herbertson proceed to consider geography according to natural climatic regions as distinct from the more orthodox classification into political divisions. As, however, after all the latter tend to approximate to the former, no great shock to the feelings of the old-fashioned teacher will be sustained. A glance at the table of contents will show the scheme. The headings for Africa are illustrative: "The Mid-world Deserts," "The Sudan," "The Guinea Lands," "The East African Savanas," "Africa south of the Zambezi," "African Islands," while the north-west corner is included in a preceding heading, "The Mediterranean Region," which naturally deals principally with Europe.

We are glad to note that, as in vol. ii., the *human* element is everywhere. The gaps in the chalk of south-east England, and the consequent effects on the growth of Kent and Sussex towns, the influence of climate and physical features on the economic geography of Japan, or the lessons conveyed in the distribution of English and Scotch names in the south island of New Zealand, are instances to the point. The numerous maps and diagrams are, with few exceptions, most illustrative. The exceptions are those which—well enough in their way, even if a trifle indistinct in places—are hardly necessary. The routes and towns, for instance, of the Balkan Peninsula, of Italy, of Spain (Figs. 6, 7, 8), and of every other country, are better and more clearly shown in good school atlases than in a little square some 3 to 4 inches each way. Uniformity—an essential for purposes of comparison—also suffers when there are allowed to appear on opposite pages two maps, dealing with the same region, wherein solid black is used to delineate in the one the highlands over 3000 feet, and in the other the fertile soils of the Barbary States (Figs. 10, 11). On the other hand, such educational studies as the sketch of Lower Andalusia (Fig. 9), with its explanatory note and letterpress, or even the somewhat complicated diagram of the routes from Vienna (Fig. 23), also with full explanations, are excellent. They *make* the student refer to his big atlas, and they make him think. The resourceful teacher will make good use of these sketch-maps, and will find in them abundant material for the "exercises" recommended by the Board of Education in its "suggestions" to geography masters and mistresses. Any one who cares to try should sample Figs. 60–67 (Climatic Conditions of the Monsoon Lands); they contain a wealth of suggestion.

E. R. W.

### Exercises in Physiography.

'An Introduction to Practical Geography.' By A. J. Simmons and H. Richardson. London: Macmillan & Co. 1907. In three parts. *Price* 1*s. each.*

In the preface this book is stated to have grown out of a collection of exercises for Prof. Gregory's revision of Huxley's 'Physiography.' Its title is somewhat ambiguous, and would have been more descriptive of the contents had it been 'Practical Physiography.' If it is not a practical geography, at least the needs of the future geographer have been borne in mind, with the result that any school boy or girl who has gone through a course judiciously selected from the numerous exercises in the book will be exceptionally well prepared for geographical work.

Section I. contains elaborate exercises on measurements by pacing, chain, ruler, compass, and square paper. It is full of hints, not merely for the geographer who

wishes to train his pupils in the construction and use of maps, but for the teacher of arithmetic and mechanical drawing.

Section II. begins with measurements on globes, and passes to latitude and longitude, correlating the exercises with co-ordinate geometry, the teaching of which might well be based on the exercises as are given here. Sun and shadow and sundials are dealt with very fully, and lead up to problems in longitude and time, day and night, and the seasons. This section is closed by a chapter on map projections, which unfortunately contains a common error about Mercator's projection in Figs. 116 and 120, where the central cylindrical projection is illustrated and described under the name of Mercator. Two polar projections are shown, but the name is given only to one, which ought to have been called the central polar projection.

The third section deals with climatic, or rather with meteorological, observations and with weather, the climatic studies being confined mainly to the British Isles. The successive chapters are on the measurements and representations of temperature, pressure, rainfall, moisture, and the observations of frost, snow, and ice. The section is full of very valuable exercises, but when gravimetric determinations of the mass of water-vapour, the construction of a barometer, and volumetric experiments are suggested, we do not understand why simple experiments on specific and latent heat were omitted. They are very important preliminaries to geographical work in upper classes, and if the objection is that they are not geographical, that applies to a very large proportion of the exercises in the book. Except for the British Isles, the fundamental climatic geographical exercises are hardly touched upon, although an infinite variety of interesting and valuable exercises can be devised.

The fourth section deals with land and sea. River waters are analyzed, and a number of questions relating to different kinds and parts of rivers are suggested which will prove useful in geographical excursions. In the second chapter of this section, admirable questions involving the use of maps are inserted, and might with advantage have been extended. In the chapter on the sea, the composition of seawater, surface waves, and tidal movements are dealt with, but the great currents of the ocean are neglected. The third chapter suggests exercises in plant geography in a series of questions which are well drawn, but, again, too little attention is paid to map studies other than those of the immediate neighbourhood, for which, however, there are a few excellent exercises. The last chapter, on Man's dwelling-place, is very scrappy.

The book, as a whole, is obviously the result of much thought and of experience in teaching. Its great merit is that it suggests lessons in advanced nature studies, or physiography, many of which at the same time may be used in classes of arithmetic, mathematics, physics, and chemistry. It is modern in its efforts at co-ordinating studies. Further, the exercises are of great practical value, and are a definite preparation for geographical work. We wish that the ordinary student had a quarter of the knowledge which would be obtained by any one working systematically through this book, before he came to seriously study geography in the university. The publication of the book in three parts is a great value, as it allows the exercises to be taken in a three years' course.

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## THE MONTHLY RECORD.

### EUROPE.

**The Evolution of the Shannon.**—A paper in the *Proceedings of the Royal Irish Academy* for March, 1907, by Mr. J. R. Kilroe, of the Geological Survey, discusses the question of the geological history of the Shannon and its basin. It is

necessarily to a considerable extent based on hypothesis, but some interesting points are brought out. In tracing the present contours of the basin and its bounding heights, the author points out the slight elevation above the sea and extreme flatness of the limestone plain (as compared with the greater elevation of the sandstone hills), as well as the insignificant fall between Lough Allen and the estuary. The level along the watershed falls in places below 200 feet, and a lowering of less than 300 feet would bring the waters of the ocean into the basin from three different sides. The striking accordance in the summit levels of the principal groups of Irish mountains, at between 2500 and 3000 feet above the sea, is held to indicate that the original Shannon drainage was developed on a surface occupying this level, which the author, following the school of Prof. W. M. Davis, is inclined to regard rather as a peneplain than as a plain of marine erosion. In the formation, since Eocene times, of the present surface features, a differential erosion of something like 2500 feet has thus to be accounted for, and the discussion of this question occupies the greater part of the paper. From a consideration of the river's discharge and the probable proportion of mineral substances contained in the water, Mr. Kilroe arrives at 30,000,000 years as the length of time required by the process under the ordinary sub-aërial agencies, though it must be confessed that guesswork enters very largely into the calculation. This seeming to him to be a somewhat excessive length of time, he considers whether it might be shortened by calling into play the action of ice. He thinks that there are undoubted indications that the gorge at Killaloe, in its later stages, was cut by ice, and that the irregular contours of the bed of Lough Derg above the gorge also point to the same agency—the case of Lake Iseo, in Lombardy, investigated by Dr. Hess, being cited as a parallel instance. He is, however, disinclined to attribute to ice the great erosive power assigned to it by many continental and American geographers, and thinks that the differential lowering of the surface, resulting in the present features, is more consistent with the mild reduction due to sub-aërial waste than with the supposed drastic force of an ice-sheet. Yet he suggests that ice may have helped to remove material already worked upon by atmospheric agencies, thus shortening the process, though he does not make it clear how the whole of this vast amount of waste can have been carried away by the narrow Killaloe gorge, through which—and not by the Scarriff valley, once utilized by the lower Shannon—he supposes the glacier to have passed.

**Geography and Demography of Lower Languedoc.**—An article by M. Max Sorre, of 112 pages, in the *Bulletin* of the Languedoc Geographical Society (vol. 29, nos. 2, 3, 4), deals with the relation of the geography to the distribution of population in Lower Languedoc, the subject being further illustrated by maps. The great diversity of races that from early times has possessed the land has favoured the adjustment between its very diverse soils and its humanity. Occupied from prehistoric times, the land has been the home of Iberians and Ligurians; of Volcae, many of whose "vici" subsist; and of Romans. By way of the sea, again, the land received the impress of Phœnician and thence of Greek civilization. Agde and Rhodanusia are transplantations from Marseilles. In the Middle Ages cities like Montpellier and Cette grew up. Within the last fifty years agricultural crises have upset the economy, and therewith the normal equation, of the geography and demography of the land. The two main sources of wealth are viticulture and sericulture. First appearing in France in 1863, phylloxera in less than nine years ruined the vineyards of Gard, and by 1881 overtook all Hérault. In the wake of the phylloxera there followed, in the region of the vine, a corresponding decline of population, notable particularly in towns of more than 3000 inhabitants. Thereon succeeded the silk blight, and with it a corresponding shrinkage of population in Ardèche, Gard, Hérault, and Drome. To supply the

depletion in the plains, an afflux of population from the mountains set in, and an equilibrium is now once more in process of re-establishment. To exhibit the normal relation between land and population, the article distributes the country into twelve natural regions, each comprising a number of demographic groups, *i.e.* communes topographically contiguous and of like density of population, the mean density of each group being indicated on the map. A commentary on the map analyzes each of the regions in respect of its geology, hypsometry, hydrography, culture, and, as the resultant of all these, its demography. Each region is further illustrated by a cartoon representing the different characters of its soils and the corresponding distribution of population. The paper includes a special study of the rural population, agglomerate and dispersed, and a summary estimate of the geographical, climatic, cultural, and geological factors of population.

**The Language Question in Switzerland.**—This question has been a good deal to the fore of late, in part owing to the formation of the *Deutschschweizerischer Sprachverein*—an association for the diffusion of German in Switzerland. The view that the Romance languages are likely in future to give way still more than in the past before the Teutonic is contested by M. R. Henry, who has for some years made a study of the question on the spot, and has published, in the *Questions Diplomatiques* for April 1 of this year, a language map of Switzerland showing the position at the present time, accompanied by a brief commentary. Besides summarizing the broad facts of language distribution, the writer notices some of the influences which tend to the diffusion of one or other of the languages. In the most thoroughly French cantons—those of Geneva, Vaud, and Neuchâtel—the old patois have entirely given place to French, which thus, M. Henry thinks, possesses some advantage over the German language, of which many separate dialects are still spoken in the German portions of the country. Some of the industries, such as watch-making, attract French artisans, who carry their language with them; but, on the other hand, many German-speaking workmen have flocked to the industrial centres of the Bernese Jura, and the question whether these will adopt the French language spoken around them is one of the most practical questions of the moment. Railways exercise a considerable influence, and the writer considers that the piercing of the Simplon will adversely affect the German language of the Haut-Valais, though the effect of the piercing of the Loetschberg would be just the contrary, as placing the Germans of Valais in closer communication with their linguistic allies. The influence of railways is to be seen also in the Grisons, where the linguistic isthmus at present connecting two areas of Romansh-speaking people south-west of Coire will evidently be cut through in the near future.

### ASIA.

**Ethnographic Explorations in Arabia Petræa.**—The well-known Austrian Arabist, Prof. Alois Musil, has lately described his researches in a report to the Imperial Academy of Sciences in Vienna and in an address to the Geographical Society there. In his journeys Prof. Musil had more in view than the investigation of natural features and the discovery of the remains of an outworn culture. His aim was also to learn how the present inhabitants feel, think, and live; what are their traditions; their religious, social, and political views; their morals, customs, and songs; their food, their employments;—everything, in short, connected with the life they live. In this investigation he was no doubt prompted by the conjecture that among these inhabitants of the deserts numerous echoes of the oldest intuitions would survive. Researches of this kind are among the most interesting, but also the most difficult that can be prosecuted. It is difficult to gain the confidence of the people, and more difficult still to transplant one's self into their spiritual level and

frame one's questions aright. It does not do, for example, ever to make direct inquiry for the information wanted. You must begin with perfectly innocent questions, and in every case let the person answering have his full say out. In the case of each tribe Prof. Musil made inquiry about its subdivisions, clans, and families, its insignia, traditions, and watering-places. In that way he learnt what were the ideas formed by the natives of the origin of a tribe, what clans were distinguished by them as autochthonous and what as immigrant, what particular knowledge they had of the origin of the different clans, etc. Many traditions may, on the authority of literary documents, be dated back many hundreds of years. From an inscription in one of the castles of the caliphs discovered by him, Musil was able to confirm and supplement one of the traditions. Many tribes have a vocabulary of their own, as also peculiar morals and customs distinguishing them from their neighbours. That made it necessary for the scholar to extend his ethnographic inquiries over all peoples, both settled and nomadic, in Arabia Petræa, and even in the case of several tribes to make more specific distinctions. The settled inhabitants call themselves "Fellâhîn." It is only the nomads or camel-rearers that are styled "Arabs;" the title of "Bedawin" is given to them only by way of nick-name. The former alone are Mohammedans. The latter have a primitive Semitic religion, with neither priest nor temple. While the volumes "Moab" and "Edom" contain the topographic, the manuscript laid before the Academy in May contains the ethnographic report of the journey. It presents, as it were in mosaic, a strictly faithful picture of the life of to-day in Arabia Petræa. Musil describes the life of no less than forty-eight different tribes, and joins a literal translation with all the texts cited. The letter-press is illustrated by seventy pictures from photographs taken by the traveller himself. This ethnographic report of his journey will, it is probable, appear in print as volumes 4 and 5 of the whole work before the end of the year. A part containing the "Epigraphy" is still to follow. Next year Prof. Musil thinks of returning to the scene of his fruitful investigations, it being his intention to visit the region bordering Arabia Petræa on the east, which on all maps still shows a white blank.

**Ascent by Dr. Longstaff in the Himalayas.**—On July 1 a telegram was received in this country from Dr. T. Longstaff, announcing his successful ascent on June 12 of the peak of Trisul, in the Garhwal Himalayas. He was accompanied by the two Brocherels, the well-known Italian guides, and by the Gurkha native officer Karbir. The peak lies to the south-west of Nanda Devi, and its height, as given by the Trigonometrical Survey of India, is 23,406 feet above sea-level. Further particulars will be awaited with interest.

**Dr. Wegener in Central China.**—Dr. G. Wegener, of Berlin, who has for some time been a student of the geography and economic conditions of the Far East, has lately completed a journey in various parts of China and neighbouring regions, the results of which are likely to be of considerable interest. One of his latest journeys took him to one of the least-known parts of Central China, in the province of Kiangsi, which, as Dr. Wegener points out, possesses a marked geographical unity from the fact that it is virtually coextensive with the basin of the Poyang lake, and its main feeder the Kan. Although the route by this river was once so important a line of communication between Northern and Southern China, and as such was used by many of the early European embassies, its importance has greatly declined with the development of sea traffic, and it has been strangely neglected by scientific travellers in modern times. Dr. Wegener says that his outward route through the east of the province had not previously been traversed by any European, and his journey will form a useful supplement to the investigations by Mr. Consul Clennell, referred to in the *Journal*, vol. 27, p. 301. In order

to avoid the rains and accompanying fever, the traveller visited Kiangsi at a season when the lake and rivers were at a low stage, their navigation being somewhat difficult. When crossing the Poyang lake on the outward journey, many sand-banks were showing above its surface, and on the return it was little else than an expanse of sand traversed by river-channels. It is from this source that the sand of the extensive dune-formations of this region is derived. From Nanchang, where the first beginnings of the advent of Western influence were observable, Dr. Wegener took the route up the valley of the Fu river, the second largest in the province, which in a not very near future may serve as the route of a railway to Fukien, as that of the Kan may to Canton. The traveller passed through the great rice-field of Lower Kiangsi, one of the most thickly populated agricultural regions in the world, and found that the lowlands extended further in this direction than is shown on the maps, the mountains beginning only in the neighbourhood of Kienchang. Even here the river-valley forms a wide break between the mountains occupying the interval between the Kan and the Fu rivers and those on the Fukien border. Dr. Wegener ascended the Hsinfong Shan, probably the highest mountain in the province, and found its height, by boiling-point thermometer, to be 5320 feet, or greater than has been supposed. The Kiangsi mountains make a more imposing impression than their mere height would warrant, owing to their steep, sierra-like forms, and the deeply cut valleys. The ranges hardly form a continuous *massif*, but rise like islands above the general level, their general nature confirming the brilliant guess of Richthofen. Dr. Wegener crossed the water-parting between the Fu and the Kan, and reached the main headstream of the latter, which proved to be the Ningtushui, and not, as has been supposed, the Kung. This section of the route led through a region as untouched by civilization as any within the Chinese Empire. The descent of the Kan (which is broken in places by rapids, though, as the river rises over 12 feet, they should be quite passable by river steamers in summer) led through a district in which the sugar-cane is the principal object of cultivation. By far the most important town on the river is Kingan-fu, while some that have long appeared on the maps as important places have been eclipsed by more modern ones. The plain of the lower Kan (which had already been visited by Mr. Clennell) is in great part meadow-land.

**Survey Work in Seistan.**—In the "Report of the Board of Scientific Advice for India" for 1905–06, which anticipates by a considerable space of time the ordinary Annual Survey Report for the same period, Colonel Burrard refers to the excellent geographical work done in Seistan by Mr. G. P. Tate, of the Survey of India, who was attached to the Seistan Mission under Sir H. McMahon, and made a geographical survey of 42,000 square miles on the scale of 4 miles, and 3000 square miles on the 1-mile scale. Mr. Tate's map and memoir are now being prepared, and as the latter will contain accounts of the ancient and modern topography of Seistan, as well as its archæology and ethnology, its interest will be readily appreciated. Mr. Tate estimates that the Seistan oasis, which is really the delta of the Helmand, supports a population of 105,000. The Hamun or lake into which the Helmand pours its waters is nowhere deeper than 10 feet; its area is about 2000 square miles. The further study of the physical conditions of the lagoon will no doubt throw light on the desiccation of the region in question; at present Colonel Burrard inclines to the belief that the sand is slowly regaining the mastery over the water, and that the rivers will be eventually stopped or practically dried up. This, however, must in some measure depend on the irrigation works that may hereafter be constructed, and that may conduce to the regeneration of the country and the possible improvement of the climate. Colonel Burrard himself makes mention of the well-known fact that in ancient times large and important irrigation works

existed in the valley of the Helmand river, and that their decay and ruin have been a material factor in the desiccation of the land.

**The Sanpo.**—In the same report Colonel Burrard gives a short note calling attention to the peculiar feature in the hydrography of the Sanpo that all its principal tributaries have a tendency to flow in a direction contrary to that of the main stream. This Colonel Burrard accounts for by the surmise that at no very distant date the Sanpo flowed from east to west along its present trough, and that the several tributaries were developed during that period of the river's history. Later on he supposes that the river formed a great lake in South-Eastern Tibet, which overflowed across the southern ranges, and gradually cut a gorge through them. The same process, it is remarked, is happening in Kashmir where the Jhelum is carving a gorge; the drainage of the Kashmir basin has but one outlet, and overflows at the lowest notch in the rim of the basin. At the point of overflow a deep chasm is being cut in the Pir Punjal range.

## AFRICA.

**Egypt and the Sudan in 1906.**—The latest annual report on Egypt and the Sudan contains, as usual, a large amount of information on the progress of those countries, and offers a special interest as being the last to be sent in by Lord Cromer before relinquishing his arduous but brilliantly executed task as British agent. Only a few points of interest can here be touched upon. Since the satisfactory conclusion of the frontier question in the Sinai peninsula it has been decided to put an end to the dual control over that area, and bring the whole under the War Department, a British officer acting as Mudir and Commandant. The economic condition of the country is still spoken of as thoroughly sound, and although the cotton area had suffered some reduction, the largeness of the crop had put matters on a favourable footing, for the time being at least. The Nile flood of 1906, if not a really good one, at least came up to the average, which could not be said of those of the seven previous years. The Assuan reservoir fulfilled its functions admirably, contributing daily from 6 to 20 millions of cubic metres from May 10 to July 21, when the flood water had already arrived. Nothing is said in the report regarding the heightening of the dam, which has apparently been decided on since the date of its preparation. A marked increase is recorded both in the number of passengers and the amount of goods carried by the railways, while details are given of the important works lately executed at the port of Alexandria. With regard to the Sudan, attention is called to the huge distances which separate the principal towns, and the prime necessity is shown to be an improvement of communications, without which it would be premature to undertake irrigation works on a large scale. The opening of the Red Sea and Nile railway is too recent to have yet had any very marked results in the way of commercial development. One of the most important desiderata is the opening up of the Ghezireh or tract between the Blue and White Niles, and as a first step towards this, a grant has been made for a bridge over the Blue Nile between Khartum and Halfaya. This will be followed by a line of railway up the middle of the tract, with branches to both rivers. A report by Sir W. Garstin on the possible irrigation of this area is printed in an appendix. It recommends, in the place of a flood-canal (which would allow only dhurra to be raised), the construction of a barrage and canal giving irrigation-water after the flood has passed along. By this means wheat could be cultivated over half a million acres, cotton-growing being also possible. The area in the Ghezireh that could be eventually irrigated, north of Wad Medani, is estimated at between 3 and 4 million acres. Good progress was made during 1906 with the telegraph line to the south, and communication with Gondokoro

was shortly to be opened through the Bahr-Ghazal province, the break in the line due to the marshes between Taufikia and Meshra-er-Rek being bridged over by a weekly service of oil-launches. Navigation on the Nile, etc., had been actively maintained, and 1000 tons of building material, stores, etc., had been transported up the Jur river to Wau. It had not been yet found possible to open up direct water-communication with the French Congo, but steps had been taken to survey the route for the proposed railway through the Lado enclave. Careful surveys had been made by Mr. Walsh and other officers of the irrigation service in the region of swamps of the White Nile, a traverse being made (among others) along the line proposed for a new channel of the upper river.

**Geology and Ethnology of Madagascar.**—The researches of French students continue to add to our knowledge of the great African island, and though hypothesis must still largely enter into any discussions of its past history, whether physical or ethnological, this is now supported by an increasingly large body of facts. Since M. Gautier's work on the physical geography of the island appeared in 1902, a good deal of geological work has been done, especially by Prof. Lemoine, who sketches the present position of our knowledge (with special reference to economic geology) in the *Revue de Madagascar* for February 10 of this year. His own studies have been devoted to a large extent to the sedimentary formations by which the old crystalline massif is flanked, especially on the west. Unlike M. Gautier, who considered the oldest of these to belong to the Trias, M. Lemoine assigns the important series of sandstones which immediately overlie the Archæan rocks to the Lias; and as similar formations occur on the African coast, he places at this epoch the first separation of the old "Gondwana" continent into an Australo-Indo-Madagascan and an Africano-Brazilian portion, the Mozambique channel then acquiring an importance which it has never since lost, although Madagascar must, he allows, have been temporarily united to Africa to permit the immigration of the lemurians in early Tertiary times. From the economic point of view the old crystalline rocks are the more important, though the coal deposits found in other parts of the Gondwana region are absent; and the gold has hitherto been rarely found in the form of veins, but is most often disseminated throughout the mass of the gneiss and granites. Iron, copper, graphite, and asbestos also occur in this section. In the sedimentary rocks, the abundance of limestone in the west and north will permit of the exploitation of lime and cement, at least for local needs. In the same number of the journal alluded to, M. G. Ferrand, of late years one of the most zealous students of the history and ethnology of the island, summarizes his conclusions on these subjects, largely based on comparative linguistic studies. He considers that there is absolute evidence of a Sanskrit element in Malagasy, pointing to an immigration of Hinduized Malays, probably from Sumatra. Its date is placed within the first millennium of our era. It was preceded, in M. Ferrand's view, by an important Bantu immigration, indicated, *inter alia*, by Bantu elements in common words (*umbi*, ox; *undri*, sheep, etc.) occurring in all the dialects known during the sixteenth century, and in all modern dialects. The supposed Jewish immigration is treated as a myth, while there is held to be no justification for applying the term "Indo-Arab" to the invasions which Islamized the east coast. The mention of the last Abbaside khalif, in a document from the island preserved in the Paris National Library, is considered to point to an Arab immigration about the middle of the thirteenth century, while evidence of a Persian immigration also exists. M. Ferrand has also evolved some new notions respecting the structure of the Malagasy language.

## AMERICA.

**Recent Work of the Geological Survey of Canada.**—The Summary report for 1906 on the operations of this survey shows that a large amount of excellent work was done during the year, though rather of the nature of detailed examination of fairly well-known areas than of exploration further afield. It is proposed in future to adopt the plan of working from the known to the unknown, devoting the chief attention to such regions as are likely to come to the front from the point of view of economic development. Thus in 1906 much of the work consisted in a careful examination of tracts along the routes of proposed railways, especially the Transcontinental and Hudson bay lines. Prof. J. Macoun studied the country to be traversed by the former between Portage la Prairie and Edmonton, and found that, though communications are still undeveloped, settlers have already established themselves in many parts, and are raising excellent crops. The constant record was rich soil and immense wheat-fields. The 100 miles west of Touchwood made a particularly favourable impression. There is practically no bad land, and the alkaline flats of former writers are the best wheat-fields of to-day. Mr. McInnes' explorations along the proposed line of the Hudson bay railway, to the north-east of the lower Saskatchewan, yielded some matter of geographical interest. He divides the region into three areas—the first underlain by the horizonal or gently undulating magnesian limestones of Northern Manitoba; the second, an Archæan area, forming a somewhat broken and rugged country extending from the northern edge of the limestone escarpment until covered by the lacustrine sediments of the third or clay area. It is this last only that contains much ground suitable for cultivation, the arable lands being chiefly confined to the old basin of the glacial Lake Agassiz, the sedimentation in which supplied the existing soil-cover—a friable deep-brown clay with admixture of vegetable matter. Though generally wooded, the trees are small in size, but from their slow growth would furnish firm and strong timber. The climate seems suitable for general agricultural operations, no frosts being experienced in the summer of 1906 until the night of September 29. Mr. O'Sullivan, who examined the country between Split lake and Fort Churchill, reports favourably on the latter as a port, and says that there seem to be no great difficulties in securing a good line for the railway along the route followed. Mr. Collins explored the Trans-continental route west from Lake Nipigon, through a portion of the Archæan peneplain of this region. The surface is practically one of solid rock, the impervious character of which, coupled with the low relief, favours the accumulation of a vast amount of water in superficial depressions. The western portion is auriferous and iron-bearing; but further east the country is rugged and of little economic importance. The work of several field-parties was devoted to the study of the mineral resources of various parts of Canada, and an important result was the discovery by Mr. Dowling of a large coal-field extending north from the Saskatchewan to past the Brazeau. In the oil-fields of Southern Alberta encouraging indications have been obtained, though the practical results of operations have hitherto been small. Mining in the southern part of the Yukon has given encouraging results, the copper deposits in particular having proved extraordinarily rich.

**Survey of the Northern Frontier of Bolivia.**—Further letters from Major P. H. Fawcett (see *Journal*, vol. 29, p. 574) give a detailed account of his ascent of the upper Aquiry from Bahia, in company with Mr. A. J. Chivers. The journey up and down occupied all but a couple of months, Bahia being left on December 26 and reached again on February 23. The Aquiry, in this section of its course, Major Fawcett describes as purely a rain river. At Bahia it will rise in from one to four

days and fall in a similar period, while higher up it has been known to fill in a night and fall in a day, a drop of 6 feet in seven hours being recorded by the expedition on one occasion. From the start the course of the river was found to be extremely tortuous, and the action of the rain-floods is always tending to increase the sinuosity. Hence Major Fawcett concludes that an exact survey would serve no useful purpose for more than a few years. Considerable difficulty was experienced in the ascent, owing to the numerous snags and sandbanks. The canoes had frequently to be hauled over great trees bridging the river, or, when this could not be done, had to be emptied, sunk, and passed underneath the trunks. Above the mouth of a small tributary named the San Lorenzo, the character of the Aquiry changes completely, the river becoming a series of cachuelas, or rapids, flowing over hard sandstone and connected by long quiet reaches almost devoid of current except at high flood, when the cachuelas are blotted out. Towards the end the stream narrowed to a width in places of only a yard or two, and ultimately a point was reached, named by Major Fawcett the Cascada Inglesa, beyond which it was impossible, with the men and the appliances available, to get the canoes. The flow of water was very feeble, and Major Fawcett estimates that the spot must be within 9 or 10 miles of the actual source, though the latter is probably almost indefinite. A record of the visit was left with a note of the position of the Cascada, which was calculated to be approximately in lat. 11° 5′ S., long. 70° 15′ W. Between the Cascada and Bahia (11° 1′ S., 68° 47′ W.) it was calculated that the Aquiry falls 119 metres (390 feet). On the return journey opportunity was taken to explore the Yaverija, a tributary which joins the Aquiry at a rubber station called Tacna, and which in character is very similar to the main stream. It is the largest tributary of the Aquiry above Bahia, and has at its mouth a width of 15 yards, the width of the Aquiry at this point being 25 yards. Rumours had been heard of the existence of a huge fossil head high up the Yaverija. What was found was the fossilized head of an ancient crocodile, probably some 15 to 18 yards in length. Though no doubt once a very fine specimen, the head had been to a great extent broken up by Indians and gumpickers. The huts of the latter extend for a distance of three days' journey up the Yaverija and are also scattered along the banks of the Aquiry in between the barraccas, or rubber stations. The last station encountered on the Aquiry was a little above Tacna, and at the time of the commission's visit had been established only six months. In all the settlements rubber is common currency, and when the river is full steamers and launches ascend some distance above Bahia to engage in trade. Major Fawcett does not, however, paint a very bright picture of the general conditions, which have radically changed since Chandless ascended the Aquiry in 1864. The barbaros, or savage Indians, had not then been subjected to raids by labour-hunting parties, and were of a friendly disposition; the "monte" or forest was well stocked with game, and the rivers with ducks. Now Major Fawcett reports that matters are reversed. Of the savage Indians the commission saw only such indications as the remains of camp-fires and small dugout canoes, and unless an expedition carries its own supplies it must be prepared to starve. Chandless's map, or the reproduction of it seen by Major Fawcett, is to-day incorrect in many respects, particularly, Major Fawcett is convinced, in representing the Aquiry as extending to long. 71° 10′ W.

**Swedish Expedition to Tierra del Fuego.**—Mr. Carl Skottsberg, one of the members of the recent Swedish Antarctic Expedition, sends us some particulars as to a new scientific expedition to the extreme south of South America which he is organizing. He will leave Gottenberg in September, accompanied by two young scientific experts, Messrs. P. Quesnel and T. Halle, both primarily geologists, though the latter is also a clever bryologist. The expedition will not sail in a ship

of its own, but will make use of the ordinary mail steamers and coasting vessels for transport to the scene of action, where the main work will be done on land. Tents, sleeping-bags, and the necessary apparatus for botanical, geological, zoological, and meteorological work, will be taken. Proceeding *viâ* Buenos Aires and Montevideo to the Falklands, the leader and Halle will there spend the summer of 1907–8 for the purpose of continuing the researches begun by the Swedish Antarctic Expedition, Quesnel meanwhile going to Punta Arenas, where he hopes to make an excursion to the Cerro Payne region. On reuniting at Punta Arenas, the party will, if time permits, make an expedition to the northwards along the Cordillera and round Otway and Skyring waters, before winter sets in. This will be spent in the rainy region of the western channels, and in the spring an attempt will be made to reach Lago Fagnano, the party then moving its headquarters to the region of Beagle channel. It is proposed to conclude the summer's work with a trip to Tekeenika bay, returning to Sweden in April or May, 1909.

## AUSTRALASIA AND PACIFIC ISLANDS.

**Visit to Dutch New Guinea.**—Mr. A. E. Pratt has lately paid a visit to Fak-Fak—a small station with a Dutch assistant resident and some Chinese and Arab traders—on the south coast of New Guinea, just east of McCluer inlet. What civilization has reached the spot has been derived chiefly from the Arabs, who have a mosque and have made a good many nominal converts among the coast natives. The houses are fairly well built. A fine lately paid by the hill natives for an attack on the station consisted in some old bronze cannon—an interesting memento of the early Portuguese voyages to these parts. The forests contain wild nutmegs, dammar, and valuable timber; and the fauna includes, besides birds of paradise, a gigantic black and gold butterfly (*ornithoptera*) measuring 8 inches from tip to tip of the wings, and a tiny cockatoo, only 2½ inches long, including crest. Bêche de mer and pearl shells occur on the reefs, and the bays are said to be infested with great cephalopods, which, according to the natives, have been known to attack canoes.

## POLAR REGIONS.

**Dr. Charcot's Proposed Antarctic Expedition.**—We have received from Dr. Charcot further details respecting the plans for his new expedition, which have already been briefly referred to in the *Journal* (vol. **29**, p. 464). In discussing the objects to be kept in view, the explorer lays stress on the importance of penetrating as far as possible into the unknown, while at the same time disclaiming the intention of risking the scientific results for the sake of mere vain-glory. The choice of the same field of exploration as on the former expedition was made, after due consideration of the plans of other expeditions now being organized or projected, for the following reasons: (1) The importance of gaining further knowledge of the almost unknown Alexander I. Land; (2) the possibility of the existence in that region of an ice-barrier similar to that of Ross, over the surface of which an advance could be made; (3) the advantages of continuing the scientific work begun by the former expedition, and utilizing the experience gained by it; (4) the support to be expected from the Argentine Republic in view of the excellent relations entered upon on the former occasion. While recognizing the advantages that might accrue from the provision of a second ship, the available funds are not likely to admit of this. As has already been announced, a ship will be specially built for the expedition, and Dr. Charcot, who has made a careful study of all the points to be kept in view in its construction, hopes that the work may soon be definitely put in hand. While large enough to permit the carrying on of scientific work under

suitable conditions, the ship will be small enough to enable it to navigate in safety along the coasts and to seek shelter in small coves. Besides ordinary sledges, it is proposed to take motor-sledges for possible use on the surface of an ice-barrier. As already announced, Wandel island is chosen as the final base of operations, and from this it is hoped to explore the coast of Alexander I. Land as far as possible, choosing winter quarters on the land, and thence undertaking expeditions into the unknown area, scientific work being at the same time prosecuted at the base. During the second summer an attempt would be made to navigate westward as far as possible in the direction of King Edward VII. Land, and supplies will be taken to admit of a second wintering in case of necessity.

### GENERAL.

**A Rapid Journey round the World.**—A Fellow of this Society, Colonel H. Burney Campbell, writes to announce his return from a journey round the world in the exceptionally short time of 40 days 19½ hours. Needless to say, the journey was made by the Canadian Pacific and Siberian railways, and did not therefore cover the full circumference of the globe, but, as Colonel Campbell points out, he traversed the full extent of the largest land masses of the world. It has, of course, long been recognized that since the opening of the Siberian railway the circuit of the world could be accomplished in a surprisingly short time, but we are not aware that Colonel Campbell's record had previously been attained. He was on the whole fortunate in making his connections, though he came near missing that at Vladivostok by running aground in the sea of Japan.

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## CORRESPONDENCE.

### The Inclosure of Common Fields.

Dr. Gilbert Slater, in the January number of the *Geographical Journal* (pp. 35–55), has attempted to connect the growth of the English inclosures with the survival in certain districts of a Keltic type of village community, and he illustrates his theory by a very striking map (p. 40). It is, however, somewhat difficult to bring the facts revealed in this map into close relation with known history. The western boundary of Dr. Slater's inclosures does, indeed, coincide roughly with the limit of peaceful civilization during the first four centures of our era. But that limit itself is due not so much to racial as to geographical considerations. The civilization extended as far as the hills of Yorkshire and Derbyshire, Wales, and West Somerset, and there it stopped, because the uplands were ill suited to it. A still greater difficulty arises on the eastern boundary of the inclosures. The inclusion of Essex and Suffolk and the omission of Norfolk, the inclusion of the West Sussex littoral and the omission of Kent and half Surrey and three-quarters of Sussex cannot be easily explained as racial; nor does it appear to be simply geographical. A better solution has been suggested to me by Mr. J. Rose, of Oxford, with whom I was lately discussing Dr. Slater's article. He bade me compare Dr. Slater's map with the geological map of England. The result was to convince me that geology, that is, the nature of the soils, has been a potent factor—though doubtless not the only one—in determining the growth of the inclosures shown on the map, and it seemed worth while briefly to lay this suggestion of Mr. Rose before other readers of the *Journal*.

F. Haverfield.

Christ Church, Oxford.

## The Heights of the Central African Lakes and Mountains.

Since the publication of the article in the *Journal* of March, 1907, I have received a communication from Mr. R. E. Allen, Director of Surveys, Uganda Protectorate, in which he says that a line of levels has been run from Lake Victoria at Entebbe to Lake Albert at Butiaba, and that the difference between the two was found to be 1692 feet.

This is the result of levelling one way only, so there has been no check on the figures. Nevertheless, we must now regard the height thus determined as the most reliable value for Lake Albert (2028 feet above M.S.L.).

The height published in the *Journal* was 1937 feet, obtained by an aneroid difference between Lake Albert Edward and Lake Albert.

Dr. Kohlschütter has kindly taken the trouble to send some remarks on the heights published in the same article. He considers that the probable error assigned to the difference in height between Muhavura and Lake Tanganyika is far too small, for the following reasons :—

1. He does not think Muhavura's apex is sufficiently well defined to ensure the same point being taken as the highest from every direction.

2. The probable error of the Kivu triangulation should be greater, as it was of a rapid order, and the coefficient of refraction which was used has never been stated.

He does not think it possible, judging by the results of the whole of his barometric determinations in East Africa, that his height could differ from any determination, with a p.e. of $\pm$ 13 feet, by as much as 58 feet.

The mean error of a single barometric determination after elimination of the climatic factors by his method is $\pm$ 33 feet, and the barometric height of Tanganyika given is the result of eight months' continuous observations.

T. T. Behrens.

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## The Dar Homr.

Daglingworth House, Cirencester, July 2, 1907.

The copy of the *Journal* for June, 1907, has just reached me from Egypt; in it I notice some notes on Dar Homr by Captain W. Lloyd (p. 649), and send you the following remarks :—

1. The southern boundary is Bahr el Arab and the river Kir.

Note.—The Bahr el Arab is the river Kir, and takes this name "Kir" when it enters the Dinka country either before or after joining with the rivers that join the river Lol below Sultan Robs.

2. On the map in two places it is entered, "To Dar Jange."

Note.—Does this convey anything to any one who studies the map? I presume not. Dar Jange = to Dinka country. The Dinkas are called by the Arabic-speaking races Jange, or in the western part of the Bahr el Ghazal it is more correct to say "Junge."

3. "Liang are numerous."

Note.—Am I mistaken in this word? I have never yet heard of such a beast. Should it not be "Tiang," a sort of hartebeest very common in the Bahr el Ghazal and on the lower reaches of the Bahr el Arab?

C. Percival,
Captain, Rifle Brigade.

# GEOGRAPHICAL LITERATURE OF THE MONTH.

*Additions to the Library.*

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full :—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

**A selection of the works in this list will be noticed elsewhere in the "Journal."**

## EUROPE

**England and France—Communication.** **Rodakowski.**

"The Channel Ferry." The feasibility of a train-ferry between England and France. Compiled by Ernest de Rodakowski. London: Harrison & Sons, [1905]. Size 10 × 6½, pp. xvi. and 236. *Maps, Plans, Diagrams, and Illustrations.*

**Europe—Zoogeography.** **Scharff.**

European animals: their geological history and geographical distribution. By R. F. Scharff, PH.D. London: A. Constable & Co., 1907. Size 9 × 5½, pp. xiv. and 258. *Maps and Illustrations. Price 7s. 6d. net. Presented by the Publishers.*

Considers the present distribution of various elements of the European fauna in its bearing on past changes in the configuration of the surface.

**France.** **Baedeker.**

Southern France and Corsica. Handbook for travellers by Karl Baedeker. 5th edition. London: Dulau & Co. (Leipsic: K. Baedeker), 1907. Size 6½ × 4, pp. xxviii. and 578. *Maps and Plans. Price 9s. Two copies, presented by the Editor and Publishers.*

**France—Brittany.** **Vallaux.**

La Basse-Bretagne. Étude de geographie humaine par Camille Vallaux. Paris: Ed. Cornély et Cie., [1907]. Size 10 × 6½, pp. 320. *Maps. Price 7.50 fr. Presented by the Publishers.* [To be reviewed.]

**France—Coasts.** **Girard.**

Jules Girard. Les falaises de la Manche. Paris: E. Leroux, 1907. Size 11½ × 7½, pp. 194. *Maps, Plans, and Illustrations. Presented by the Publisher.* [To be reviewed.]

**France—Loire-Inférieure.** **Quilgars.**

Dictionnaire topographique du département de la Loire-Inférieure comprenant les noms de lieu anciens et modernes. Rédigé par H. Quilgars. Nantes: L. Durance, 1906. Size 11 × 9, pp. liv. and 318. *Presented by the Author.*

The information in the bulk of the work is limited to a definition of the locality of the places, but the introduction includes some interesting notes on the history of the Department.

**Germany—Heligoland.** **Brohm.**

Helgoland in Geschichte und Sage. Seine nachweisbaren Landverluste und seine Erhaltung. Von Brohm. Curhaven, Helgoland: A. Rauschenplat, 1907. Size 13 × 10, pp. 72. *Maps, Sections, and Illustrations.* *Price* 12*s.*

An excellent monograph on the island, well illustrated.

**Germany—Rhine.** **Baring-Gould.**

A book of the Rhine from Cleve to Mainz. By S. Baring Gould. London: Methuen & Co., 1906. Size 7½ × 5, pp. xii. and 346. *Sketch-map and Illustrations.* *Price* 6*s.*

**Iberian Peninsula—Historical.** **Maguire.**

The British Army under Wellington, 1813–1814. A summary by T. Miller Maguire. London: W. Clowes & Sons, 1907. Size 9 × 5½, pp. 50. *Maps and Plans.* *Price* 4*s.* *Presented by the Publishers.*

**Iceland—Cartography.** *B.S. Belge Géologie* **20** (1906): *Procès-Verbaux*, 144–149. **Prinz.**

Les premières cartes à grande échelle de l'Islande. Par W. Prinz.

On the topographical map on the scale of 1:50,000, the publication of which has been begun by the Danish general staff.

**Italy—Apennines.** *B.S.G. Italiana* **6** (1905): 444–464. **Jaja.**

Escursion nei Sibillini (Appennino centrale). Del dott. Goffredo Jaja. *With Sketch-map and Illustration.*

**Italy—Seismology.** *Beiträge zur Geophysik* **8** (1907): 293–362. **Hobbs.**

The geotectonic and geodynamic aspects of Calabria and North-Eastern Sicily. A study in orientation. By William Herbert Hobbs. *With Maps and Diagrams.*

**Italy—Tuscany.** *Riv. G. Italiana* **13** (1906): 596–603. **Toniolo.**

Cavità di disfacimento meteorico nel Verrucano del Monte Pisano. Del dott. Antonio Renato Toniolo. *With Illustrations.*

**Italy—Venetia.** *Mem. S.G. Italiana* **11** (1905): pp. 192. **Béguinot.**

Saggio sulle flore e sulla fitogeografia dei Colli Euganei. Del dott. Augusto Béguinot. *With Map.*

**Italy—Venice.** **Magrini and Others.**

Reale Instituto Veneto di Scienze, etc. Ricerche Lagunari, per cura di G. P. Magrini, L. de Marchi, ed. T. Guesotto. Nos. 1–3. Venice, 1906. Size 10½ × 7, pp. (No. 1) 12, (No. 2) 18, and (No. 3) 22. *Illustrations and Diagrams.*

Discusses methods, etc., to be adopted for the researches lately inaugurated in regard to the lagoon of Venice (*Journal*, vol. **27**, p. 298).

**Lake of Constance.** *Globus* **90** (1906): 229–232. **Halbfass.**

Ist der Bodensee ein internationaler See? Eine Studie zur Anthropogeographie der Seen. Von Prof. Dr. W. Halbfass.

Discusses the political status of the Lake of Constance, as to which questions have lately arisen.

**Portugal.** **Hume.**

Through Portugal. By Martin Hume. London: E. Grant Richards. 1907. Size 7½ × 8, pp. xiv. and 318. *Illustrations.* *Price* 5*s. net.* *Presented by the Publisher.*

**Pyrenees.** **Baring-Gould.**

A book of the Pyrenees. By S. Baring-Gould. London: Methuen & Co., [1907]. Size 7½ × 5, pp. vi. and 310. *Map and Illustrations.* *Price* 6*s.* *Presented by the Publishers.*

**Pyrenees.** **Briet**

Voyage au Barranco de Mascun. Par Lucien Briet. Pau, 1905. Size 10 × 6½, pp. 52. *Illustrations.* (Also Spanish translation, from the *B.R.S.G. Madrid*, tome **48**. Madrid, 1906. Size 9½ × 6, pp. 52. *Illustrations.*)

Contains some striking photographs of this ravine.

**Russia—Finland—Coasts.** *Fennia* **21** (1903–04): No. 3, pp. 14. **Bonsdorff.**

Ueber die Hebung der Küste Finlands und den mittleren Wasserstand des Ostsee. Von A. Bonsdorff.

**Russia—Finland—Lakes.** *Fennia* **20** (1902–03): No. 7, pp. 108. **Palmén.**

Seespiegelsenkungen in Finland. Von E. G. Palmén. [In Swedish, with German summary.] *With Maps.*

**Russia—Kanin Peninsula.** *Fennia* **21** (1903–04): No. 6, pp. 72. **Ramsay and Poppius.**

Bericht über eine Reise nach der Halbinsel Kanin im Sommer 1903. Von Wilhelm Ramsay und B. Poppius. *With Map and Illustrations.*

**Russia—Lappland.** *Fennia* **20** (1902–03): No. 5, pp. 60. **Borg.**

Bericht über die geographischen Resultate einer Forchungsreise in den Grenzgegenden von Finnisch und Russisch-Lappland im Sommer 1901. Von Väinö Borg. *With Maps.*

**Spain—Andalusia.** *B.R.S.G. Madrid* **48** (1906): 426–499. **Pérez.**

La Alpujarra y Sierra Nevada. Por Eduardo Soler y Pérez. *With Map and Illustrations.*

**Sweden—Klar Elf.** *Ymer* (1906): 383–414. **De Geer.**

Om Klarälfen och dess dalgång. Af Sten de Geer. *With Map and Diagrams.*

**Switzerland—Aargau.** **Gilbart-Smith**

The cradle of the Hapsburgs. By J. W. Gilbart-Smith. London: Chatto & Windus, 1907. Size 8 × 5, pp. 216. *Illustrations. Price 5s. net. Presented by the Publishers.*

An account of the fortunes of the Hapsburg dynasty and of its early associations with Northern Switzerland.

**Switzerland—Place-names.** *Deutsche Erde* **5** (1906): 170–182. **Blocher and Garraux.**

Die deutschen Ortsnamenformen der Westschweiz. Von Eduard Blocher und Emil Garraux. *With Map.*

**United Kingdom—Yorkshire.** **Roth.**

The Yorkshire coiners, 1767–1783; and notes on old and prehistoric Halifax. By H. Ling Roth. Halifax: F. King & Sons, 1906. Size 10 × 7½, pp. xxviii. and 322. *Illustrations. Presented by the Author.*

There is an interesting chapter on the Frobishers of Halifax, traders and explorers in the Canadian North-West towards the close of the nineteenth century.

## ASIA.

**Baluchistan.** **Dames.**

Popular poetry of the Baloches. By M. Longworth Dames. (Publications of the Folk-lore Society, lix.) 2 vols. in 1. London: D. Nutt, 1907. Size 9 × 5½, pp. (vol. 1) xl. and 204; (vol. 2) 224. *Price 15s. net. Presented by the Publisher.*

This work is "the result of many years' labour in collecting, transcribing, and translating the ballads and verses here set forth." The author has enjoyed the co-operation of the Royal Asiatic Society, which has rendered it possible to include a complete collection of the original texts, and of the Folk-lore Society, which has issued the work as one of its annual volumes.

**Chinese Empire.** **Broomhall.**

The Chinese Empire: a general and missionary survey. Edited by Marshall Broomhall, with preface by the Rt. Hon. Sir Ernest Satow. London: Morgan & Scott, [1907]. Size 8½ × 5½, pp. xxiv. and 472. *Map and Illustrations. Price 7s. 6d. net. Presented by the China Inland Mission.*

Although written specially from the point of view of missions, this forms an excellent general description of the Chinese Empire, the several chapters being contributed by writers specially qualified, from personal knowledge, to treat of the separate provinces.

**Cyprus.** **Hutchinson and Cobham.**

A Handbook of Cyprus, compiled by Sir J. T. Hutchinson and Claude Delaval Cobham, 1907. London: E. Stanford, 1907. Size 7 × 4½, pp. xii. 132. *Maps and Portrait. Price 2s. 6d. net. Presented by the Publisher.*

**Eastern Asia.** **Weale.**

The truce in the East and its aftermath; being the sequel to 'The re-shaping of the Far East.' By B. L. Putnam Weale. London: Macmillan & Co., 1907. Size 9 × 5½, pp. xvi. and 648. *Maps and Illustrations. Price 12s. 6d. net. Presented by the Publishers.*

**Eastern Asia.** **Zepelin.**

Der Ferne Osten: seine Geschichte, seine Entwickelung in der nuesten Zeit und seine Lage nach dem russisch-japanischen Kriege. Von C. von Zepelin. I. Teil. (Russland in Asien, Band viii.) Berlin: Zuckschwerdt & Co., 1907. Size 9½ × 6½, pp. 276. *Map and Plans.* *Price* 6*s.* 6*d.*

**India.** **Yusuf-Ali.**

Life and labour of the people of India. By Abdullah Yusuf-Ali. London: John Murray, 1907. Size 9 × 5¾, pp. xvi. and 360. *Illustrations.* *Price* 12*s. net.* *Presented by the Publisher.*

**India—Burma.** **Scott.**

Burma: a handbook of practical information. By Sir J. George Scott. London: A. Moring, Ltd., 1906. Size 7½ × 5, pp. x. and 520. *Map and Illustrations.* *Price* 10*s.* 6*d. net.* *Presented by the Publisher.*

**India—Ethnology.** **Crooke.**

Natives of Northern India. By W. Crooke. London: A. Constable & Co., 1907. Size 9 × 5¾, pp. xiv. and 270. *Map and Illustrations.* *Price* 6*s.* *Presented by the Publishers.*

See review in the June number, p. 665.

**Japan—Formosa.** **Takekoshi.**

Japanese rule in Formosa. By Yosaburo Takekoshi; with preface by Baron Shimpei Goto. Translated by George Braithwaite. London: Longmans, Green, & Co., 1907. Size 9 × 6, pp. xvi. and 342. *Maps and Illustrations.* *Price* 10*s.* 6*d. net.* *Presented by the Publishers.* [To be reviewed.]

**Korea.** **Hulbert.**

The passing of Korea. By Homer B. Hulbert. London: W. Heinemann, 1906. Size 10½ × 7, pp. xii. and 474. *Illustrations.* *Price* 16*s. net.*

An excellent account of Korea and the Koreans, by one who has resided in the country and is familiar with the language.

**Malay Archipelago—Borneo.** **Nieuwenhuis.**

Quer durch Borneo. Ergebnisse seiner Reisen in den Jahren 1894, 1896–97, und 1898–1900. Von Dr. A. W. Nieuwenhuis; unter Mitarbeit von Dr. M. Nieuwenhuis. Zweiter Teil. Leiden: E. J. Brill, 1907. Size 11 × 7½, pp. xiv. and 558. *Plates.* *Price* 19*s.*

The first volume was reviewed in February, 1905 (vol. **25**, p. 202).

**Malay Archipelago—Celebes.** *Rev. Française* **31** (1906): 626–631. **Barré.**

Les Célèbes; une expedition hollandaise. Par Paul Barré.

On the military expedition of 1905 against the rebel rajah of Boni.

**Siberia—Amur.**

Explorations géologiques dans les régions aurifères de la Sibérie. Région aurifère de l'Amour. Livraison V. St. Petersburg, 1904. Size 10 × 6½, pp. 146. *Maps.* [In Russian; *résumé* in French.]

**Siberia—Lena.** **Cajander.**

*Acta S. Sc. Fennicæ* **32** (1906): No. 1, pp. vi. and 182; No. 3, pp. 40.

Beiträge zur Kenntniss der Vegetation der Alluvionen des nördlichen Eurasiens. Von A. K. Cajander. I. Die Alluvionen des unteren Lena-Thales. *With Maps.* Studien über die Vegetation des Urwaldes am Lena-Fluss. By the same.

**Siberia—Lena.** *Fennia* **19** (1902–03): No. 2, pp. 44. **Cajander and Poppius.**

Eine naturwissenschaftliche Reise im Lena-Thal. Von A. K. Cajander und R. B. Poppius.

**Tibet.** *Mem. Asiatic S. Bengal* **1** (1906): 413–419. **Francke.**

The Dards at Khalatse in Western Tibet. By the Rev. A. H. Francke. *With Illustrations.*

**Turkey—Palestine.** **Thomsen.**

Loca Sancta. Verzeichnis der im 1. bis 6. Jahrhundert n. Chr. erwähnten Ortschaften Palästinas, mit besonderer Berücksichtigung der Lokalisierung der biblischen Stätten. Von Peter Thomsen. I. Band. Halle-a.-S.: Rudolf Haupt, 1907. Size 9½ × 6½, pp. xvi. and 144. *Map.* *Price* 6*s.*

A dictionary of the place-names of the Holy Land as mentioned in early writers,

with special regard to their identification. The alphabet is completed in the present volume, and it does not appear with what subjects the second volume will deal.

**Turkey—Palestine.** *Österr. Monatschrift f.d. Orient.* **32** (1906): 133–135. ——

Die Judenkolonien in Palästina.

**Turkey—Railway.** *Quest. dipl. et col.* **23** (1907): 1–20. **Henry.**

L'Asie turque et le chemin de fer de Bagdad. Par René Henry. *With Maps.*

## AFRICA.

**Abyssinia.** *B.S. Belge études col.* **13** (1906): 673–716. **Boulvin.**

Une mission belge en Ethiopie. Par Fritz Boulvin. *With Illustrations.*

The writer accompanied M. Hénin to Abyssinia in 1905 on his appointment as Belgian Consul-General at Addis Ababa.

**Abyssinia—Phytogeography.** *Sitzungsber. K. Preuss. A.W.* (1906): 726–747. **Engler.**

Ueber die Vegetationsverhältnisse von Harar und des Gallahochlandes auf Grund der Expedition von Freiherrn von Erlanger und Hrn. Neumann. Von A. Engler.

**Africa.** **Baden-Powell.**

Sketches in Mafeking and British East Africa. By Major-General R. S. S. Baden-Powell. London: Smith, Elder, & Co., 1907. Size 9½ × 12½, pp. xii. and 184. *Illustrations and Sketch-map. Price* 21*s. net. Presented by the Publishers.*

**Africa—Ethnology.** *T. South African Philos. S.* **16** (1906): 401–412. **Péringuey.**

On rock-engravings of animals and the human figure, the work of South African aborigines, and their relation to similar ones found in Northern Africa. By L. Péringuey. *With Illustrations.*

**Africa—Exploration.** *Deutsche Erde* **5** (1906): 202–206. **Hahn.**

Deutschlands Anteil an der Afrikaforschung. Von Friedrich Hahn. *With Maps.*

**Africa—Railway.** *J.S. Arts* **55** (1906–07): 97–109. **Michell.**

The Cape to Cairo railway. By the Hon. Sir Lewis Michell. *With Map.*

**British Central Africa.** *Scottish G. Mag.* **23** (1907): 72–86. **Angus.**

On the frontier of the western Shiré, British Central Africa. By H. Crawford Angus. *With Map.*

**British East Africa.** *Tour du Monde* **13** (1907): 13–36. **Alluaud.**

De Mombassa au Victoria-Nyanza par l'Uganda Railway. Par Charles Alluaud. *With Map and Illustrations.*

**Canary Islands.** *Globus* **90** (1906): 312–316, 329–332. **Knebel.**

Studien zur Oberflächengestaltung der Inseln Palma und Ferro. Von Walther von Knebel. *With Maps and Illustrations.*

**Cape Colony—Geology.** ——

Cape of Good Hope: Department of Agriculture. Tenth annual report of the Geological Commission, 1905. Cape Town, 1906. Size 9½ × 7, pp. 296 and vi. *Maps and Sections.*

**East Africa.** **Bulpett.**

A Picnic Party in Wildest Africa: being a sketch of a Winter's Trip to some of the Unknown Waters of the Upper Nile. By C. W. L. Bulpett. London: E. Arnold, 1907. Size 9½ × 6, pp. xvi. and 246. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publisher.*

**Egypt.** **Dicey.**

The Egypt of the Future. By Edward Dicey. London: W. Heinemann, 1907. Size 7½ × 5, pp. 216. *Price* 3*s.* 6*d. net. Presented by the Publisher.*

The greater part of the book deals with the present position in Egypt, considered, however, in reference to the outlook for the future.

**Egypt—Sinai.** **Schoenfeld.**

Die Halbinsel des Sinai in ihrer Bedeutung nach Erdkunde und Geschichte, auf Grund eigener Forschung an Ort und Stelle dargestellt von Prof. Dr. E. Dagobert Schoenfeld. Berlin: D. Reimer, 1907. Size 10 × 7, pp. viii. and 196. *Map and Illustrations. Price* 8*m. Presented by the Publisher.*

**French Sudan.** **Desplagnes.**

Lieutenant Louis Desplagnes. Le Plateau Central Nigérien. Une mission archéo-

logique et ethnographique au Soudan français. Paris: É. Larose, 1907. Size 10 × 6½, pp. 504. *Map and Illustrations. Price* 12 *fr.*

Supplies the most detailed information we yet possess on the region of the Middle Niger, especially its populations. It will be reviewed in an early number.

**German East Africa.** **Paasche.**

Deutsch-Ostafrika. Wirtschaftliche Studien von Dr. Hermann Paasche. Berlin: C. A. Schwetke und Sohn, 1906. Size 9 × 6, pp. iv. and 430. *Illustrations. Price* 8*s.*

A systematic description of the most important districts of German East Africa from an economic point of view, with general discussions of the possibilities of cultivation of various products.

**Madagascar—Bibliography.** **Grandidier.**

G. Grandidier. Bibliographie de Madagascar. Deuxième Partie. Paris: Comité de Madagascar, 1906. Size 10 × 6½, pp. 435–906. *Presented by the Comité de Madagascar.*

See note on Part i. in *Journal*, vol. **27**, p. 646.

**Togo—Language.** **Seidel.**

Lehrbuch der Ewhe-Sprache in Togo (Anglo-Dialekt). Mit Uebungsstücken, einem systematischen Vokabular und einem Lesebuch. Von A. Seidel. Heidelberg: J. Groos, 1906. Size 8 × 5, pp. viii. and 176. *Presented by Mr. D. Nutt.*

## NORTH AMERICA.

**Alaska.** *B.U.S. Geol. Surv.* **278** (1906): pp. 54. **Collier.**

Geology and coal resources of the Cape Lisburne region, Alaska. By Arthur J. Collier. *With Maps, Sections, and Illustrations.*

**Alaska.** *B.U.S. Geol. Surv.* **280** (1906): pp. 54. **Prindle and Hess.**

The Rampart gold placer region, Alaska. By L. M. Prindle and Frank L. Hess. *With Maps and Illustrations.*

**Alaska.** *Petermanns M.* **53** (1907): 1–16. **Rühl.**

Ueberblick über die geographischen und geologischen Verhältnisse Alaskas. Von Dr. Alfred Rühl. *With Map.*

Based on the work of A. H. Brooks. The map gives in handy form the results of all explorations up to date, with insets showing the surface features, geology, etc.

**Alaska—Malaspina Glacier.** **Tarr.**

The advancing Malaspina glacier. By Prof. Ralph S. Tarr. [From *Science*, New York, January 4, 1907, pp. 34–37.] Size 10½ × 8. *Presented by the Author.*

See note in the April number, p. 460.

**Alaska—Minerals.** *B.U.S. Geol. Surv.* **277** (1906): pp. 80. **Moffit and Stone.**

Mineral resources of Kenai peninsula, Alaska. Gold fields of the Turnagain Arm region. By Fred H. Moffit. Coal fields of the Kachemak Bay region. By Ralph W. Stone. *With Maps and Illustrations.*

**Alaska—Yakutat Bay.** *B.G.S. Philadelphia* **5** (1907): 1–14. **Tarr.**

Second expedition to Yakutat bay, Alaska. By Ralph S. Tarr. *With Map and Illustrations.*

This expedition was carried out in the summer of 1906. Some of the results of that of 1905 were given in the *Journal*, vol. **26**, p. 30.

**America—Ethnography.** *Globus* **90** (1906): 287–289, 302–305. **Friederici.**

Die Ethnographie in den 'Documentos Inéditos del Archivo de Indias.' Von Dr. Georg Friederici. *Also separate copy, presented by the Author.*

**Canada—Ethnology.** **Hill-Tout.**

The native races of the British Empire. British North America. I. The Far West: the home of the Salish and Déné. By C. Hill-Tout. London: A. Constable & Co., 1907. Size 9 × 5½, pp. xiv. and 264. *Sketch-map and Illustrations. Price* 6*s. net. Presented by the Publishers.* [To be reviewed.]

**Canada—Geological Survey.**

Geological Survey of Canada. Annual Report (New Series), vol. xv., 1902–03. Ottawa, 1906. Size 9½ × 6½, pp. (1134). *Maps (separate), Illustrations, and Diagrams.*

Includes the summary reports for 1902 and 1903, a report on the Souris coal-field, and another on mineral production.

**Mexico—Volcanoes.** *Geological Mag., Dec.* v., **4** (1907): 5–13. **Hobson.**

An excursion to the volcanoes of Nevado de Toluca and Jorulla in Mexico. By Bernard Hobson. *With Illustrations.*

**North America—Niagara.** **Spencer.**

Niagara Falls and Niagara district. By Dr. J. W. Spencer. (From the Summary Report of the Geological Survey Department of Canada, 1905.) Ottawa, 1906. Size 10 × 6½, pp. [5]. *Map. Presented by the Author.*

Noticed in the February number (p. 227).

**United States—Appalachians.** **Brigham.**

From trail to railway through the Appalachians. By Albert Perry Brigham. Boston and London: Ginn & Co., [1907]. Size 7½ × 5, pp. viii. and 188. *Maps and Illustrations. Price* 2*s.* 6*d. Presented by the Publishers.*

An outcome of the laudable tendency lately noticeable in the United States to extend the teaching of geography, more than has been done in the past, from the physical framework to the human associations. The book traces the course of history with special reference to the highways of communication.

**United States—California.** *J. Geology* **15** (1907): 1–10. **Branner.**

A drainage peculiarity of the Santa Anna valley affecting fresh-water faunas. By J. C. Branner. *With Maps.*

**United States—Eastern.** **Smith and Halsey.**

A tour of four great rivers, the Hudson, Mohawk, Susquehanna, and Delaware, in 1769, being the journal of Richard Smith. Edited, with a short history of the pioneer settlements, by Francis W. Halsey. New York: Scribner's Sons, 1906. Size 9½ × 6½, pp. lxxiv. and 102. *Maps, Plans, and Illustrations. Price* $5 *net.*

Printed from a hitherto unpublished manuscript. The journal is valuable from the view it presents of old-time conditions in the valleys of the above-named rivers.

## CENTRAL AND SOUTH AMERICA.

**Argentine—Rio Negro.** **Alemann.**

Am Rio Negro. Ein Zukunftsgebiet germanischer Niederlassung. Drei Reisen nach dem argentinischen Rio Negro Territorium. Ein Führer für Ansiedler, Unternehmer und Kapitalisten von M. Alemann. Berlin: D. Reimer, 1907. Size 10 × 6½, pp. xvi. and 176. *Maps and Illustrations. Price* 3*s.*

Supplies useful information on the economic possibilities of a portion of the southern Argentine, mainly from the point of view of German settlement of the region.

**Argentine and Chile—Volcanoes.** *Rev. Museo La Plata* **11** (1904): 177–192. **Hauthal.**

Distribución de los centros volcánicos en la república Argentina y Chile. Por Rodolfo Hauthal. *With Map.*

**Bolivia—Alpaca.**

Ministerio de Colonización y Agricultura: Sección de Agricultura. Estudio sobre la crianza de la Alpaca en el país. Datos recopilados en cumplimiento de la Ley de 22 de noviembre de 1905. La Paz, 1906. Size 8½ × 5½, pp. 34 and xxxviii.

**Brazil—Amazon.** *Ann. de G.* **15** (1906): 449–462. **Cointe.**

Le climat amazonien, et plus spécialement le climat du bas Amazone. Par Paul Le Cointe.

**Brazil—Ethnology.** **Koch.**

*Globus* **89** (1906): 165–169, 309–316, 375–380; **90** (1906): 7–13, 104–111, 117–124, 261–268, 325–329, 345–351.

Kreuz und quer durch Nordbrasilien. Von Dr. Theodor Koch-Grünberg. *With Map and Illustrations.*

Short accounts of Dr. Koch's travels were given in vol. **26**, p. 89, and **27**, p. 505. The present series of articles is largely concerned with ethnology, and includes many photographs of the natives.

**Brazil—Pernambuco.** **Carvalho.**

Alfredo de Carvalho. Estudos Pernambucanos. Recife, 1907. Size 7½ × 4½, pp. 352. *Price* $3. *Presented by the Author.*

Miscellaneous studies, chiefly historical. One deals with Dutch explorations in the seventeenth century in search of precious metals.

**Brazil—São Paulo.**

Commissão Geographica e Geologica do Estado de S. Paulo. Exploração dos rios Feio e Aguapehy (Extremo sertão do Estado), 1905. São Paulo, 1906. Size 17½ × 13, pp. 26. *Maps and Illustrations.*

**Chile—Geology.** *Quart. J. Geol. S.* **63** (1907): 64–68. **Evans.**

Notes on the raised beaches of Taltal (Northern Chile). By Oswald Hardey Evans.

**Chile-Argentine Boundary.** **Donoso.**

Republica de Chile: Oficina de Limites. Demarcacion de la linea de frontera en la parte sur del territorio. Trabajos de la quinta sub-comision chilena de limites con la República Arjentina. [Por] Alvaro Donoso G. Santiago, 1906. Size 11 × 7½, pp. xxxvi. and 192. *Maps, Illustrations, and Diagrams.*

**Panama—Canal.** **Johnson.**

Four Centuries of the Panama Canal. By Willis Fletcher Johnson. London, etc.: Cassell & Co., 1907. Size 8½ × 5½, pp. xxii. and 462. *Maps, Portraits, and Illustrations. Price* 12*s. net. Presented by the Publishers.*

## AUSTRALASIA AND PACIFIC ISLANDS.

**Caroline Islands.** *Globus* **90** (1906): 279–283. **Senfft.**

Die Bewohner der Westkarolinen. Von Arno Senfft. *With Illustrations.*

**Marshall Islands.** *Petermanns M.* **52** (1906): 270–277. **Jeschke.**

Bericht über die Marshall-Inseln. Von Kapitän C. Jeschke.

**New Guinea—Dutch.** **Hellwig.**

*Ts. K. Nederlandsch Aardrijksk. Genoots.* **24** (1907): 63–67.

Een landtocht naar den bovenloop der Koembé-River (z. Nieuw-Guinea) van Mēraukē uit, in Aug. 1906. Door R. L. A. Hellwig.

The Koembe is the river previously known as the Amerauke.

**New South Wales—Fisheries.**

Fisheries of New South Wales: Report of Board for the year 1905. (Sydney, 1906.) Size 13 × 8½, pp. 74. *Presented by the Dept. of Fisheries, N.S.W.*

**Pacific—Trade Routes.** *Ann. der Hydrographie* **35** (1907): 53–64. **Knipping.**

Die Dampferwege zwischen Yokohama und Portland, Oregon. Von E. Knipping. *With Diagrams.*

**Polynesia.** **Grimshaw.**

From Fiji to the Cannibal Islands. By Beatrice Grimshaw. London: Eveleigh Nash, 1907. Size 9 × 6, pp. xii. and 356. *Illustrations.*

**Queensland—Water-supply.** *P.R.S. Queensland* **19** (1906): 105–132. **Wasteneys.**

Description of a typical Queensland lagoon (the Enoggera reservoir, near Brisbane), with methods of rendering the water fit for a town supply. By Hardolph Wasteneys.

**Samoa—Savaii.** *M. k.k. G. Ges. Wien* **49** (1906): 566–585. **Bauer.**

Eine Reise auf der Insel Sawaii (Samoa). Von Dr. Viktor Ritter v. Bauer.

**Samoa—Savaii.** *Petermanns M.* **52** (1906): 277–279. **Reinecke.**

Der Vulkanismus Savaiis (Samoa). Von Dr. T. Reinecke.

**Samoa—Savaii.** *Z. Ges. E. Berlin* (1906): 686–709. **Sapper.**

Der Matavanu-Ausbruch auf Savaii 1905–06. Nach Aufzeichnungen von Pater Meunel, Metteilungen von Dr. B. Funk und gedruckten Berichten dargestellt von Prof. Dr. Karl Sapper. *With Map and Illustrations.*

## POLAR REGIONS.

**Antarctic—Zoology.** **Charcot and Others.**

Expédition antarctique française (1903–1905), commandée par le Dr. Jean Charcot. Sciences naturelles: Documents scientifiques. Crustacés, par H. Coutière, Harriett Richardson, Ed. Chevreux, et A. Quidor (pp. 10, 24, 100, and 20). Mollusques, par A. Vayssière, L. Joubin, Ed. Lamy, et le Dr. Joh. Thiele (pp. 52, 14, 20, and 4). Echinodermes, par R. Koehler et C. Vaney (pp. 42 and 30). Tuniciers, par Sluiter (pp. 50). Poissons, par Léon Vaillant (pp. 52). Hydroïdes, par Armand Billard (pp. 20). Paris: Masson et Cie., [1906]. Size 11 × 9. *Map and Plates. Presented by the Ministre de l'Instruction Publique, etc.*

**Antarctic—Zoology.** [Wilson and Others.]

National Antarctic Expedition, 1901–1904. Natural History. Vol. 2, Zoology (Vertebrata, Mollusca, Crustacea). Vol. 3, Zoology and Botany (Invertebrata, Marine Algæ, Musci). London, 1907. Size 12½ × 9½, pp. (vol. 2) xiv. and (362); (vol. 3) vi. and (280). *Map, Plates, and Illustrations. Price* 60*s.* and 50*s. Presented by the British Museum (Natural History).*

The bulk of vol. 2 is made up by Dr. Wilson's report on the mammals and birds. The other collections are described by a number of specialists.

**Arctic—Spitsbergen.** **Nathorst.**

Svenskarnes arbeten på Spetsbergen (1758, 1837, 1858–1902). Af A. G. Nathorst. (From the *Nordisk Tidskrift*, Stockholm, 1906; Sjunde häftet.) Size 10 × 6½, pp. 461–477. *Maps and Illustrations. Presented by the Author.*

A summary of Swedish work in Spitsbergen, principally since 1858.

**Arctic Ocean.** **Orléans.**

A travers la Banquise, du Spitzberg au Cap Philippe, Mai-Août, 1905. Par le Duc d'Orléans. Paris: Plon-Nourrit & Cie., 1907. Size 11 × 7½, pp. 352. *Maps and Illustrations. Price* 20 *fr. Presented by the Publishers.* [To be reviewed.]

**Polar—Congress.** *B.S.R. Belge G.* **30** (1906): 325–380. **Rahir.**

Le Congrès international pour l'étude des régions polaires. Par Rahir.

## MATHEMATICAL GEOGRAPHY.

**Astronomy—Star Catalogue.** **Ambronn.**

Sternverzeichnis, enthaltend alle Sterne bis zur 6.5ten Grösse fur das Jahr 1900, bearbeitet auf Grund der genauen Kataloge und zusammengestellt von J. und R. Ambronn, mit einem erläuternden Vorwort versehen und herausgegeben von Dr. L. Ambronn. Berlin: J. Springer, 1907. Size 11 × 7½, pp. xii. and 184. *Price* 10*s.*

Most conveniently arranged for the purposes of explorers, with whose requirements the editor is thoroughly familiar by long association with their work.

## PHYSICAL AND BIOLOGICAL GEOGRAPHY.

**Climatology.** **Shaw.**

The Royal Sanitary Institute Congress at Bristol, 1906. Climate and Health. Address by Dr. W. N. Shaw. Section iii. (Excerpt from vol. **27**, No. 10 (1906) of the *Journal of the Royal Sanitary Inst.*) London, 1906. Size 10½ × 7, pp. 517–530. *Maps and Diagrams. Presented by the Author.*

**Geomorphology—Earth and Moon.** *J. Geology* **15** (1907): 23–38. **Pickering.**

The place of origin of the moon—the volcanic problem. By William H. Pickering. *With Maps.*

Noticed in the May number (p. 576).

**Glaciers.** *La G., B.S.G. Paris* **14** (1906): 261–274. **Kilian.**

L'érosion glaciaire et la formation des terrasses. Par W. Kilian. *With Sections and Illustration.*

**Hydrology.** *M. k.k. G. Ges. Wien.* **49** (1906): 523–565. **Kastner.**

Einfluss offener Gewässer auf das Grundwasser. Von Prof. Karl Kastner. *With Diagrams.*

See note in the June number (p. 679).

**Hydrology.** *U.S. Geol. Surv., Water Supply Papers* **155** (1906): pp. 84. **Veatch.**

Fluctuations of the water-level in wells, with special reference to Long Island, New York. By A. C. Veatch. *With Maps, Sections, and Diagrams.*

**Ice.** *Monthly Weather Rev.* **34** (1906): 465–467. **Barnes.**

On the formation of anchor ice, or ground ice, at the bottom of running water By Dr. H. T. Barnes.

**Magnetism—Historical.** **Thompson.**

Petrus Peregrinus de Maricourt and his Epistola de Magnete. By Silvanus P. Thompson. (From the *Proceedings of the British Academy*, vol. 2.) London: H.

Frowde, [*not dated*; 1906]. Size 10 × 6, pp. 32. *Plate and Diagrams. Price* 2*s. net. Presented by the Publisher.*

A paper read before the British Academy in November, 1906. Prof. Thompson is perhaps the best authority living on the early history of magnetism, and he here supplies an excellent sketch of the part played by Petrus Peregrinus in this connection.

**Meteorology—Air Currents.** *P. American A.* **42** (1906): 261–272. **Rotch.**

Results of the Franco-American expedition to explore the atmosphere in the Tropics. By A. Lawrence Rotch.

**Meteorology—Methods.** **Hellmann and Hildebrandsson.**

Internationaler Meteorologischer Kodex. Im Auftrage des Internationalen Meteorologischen Komitees bearbeitet von G. Hellmann und H. H. Hildebrandsson. Berlin, 1907. Size 11 × 7½, pp. viii. and 82.

Embodies the decisions of the International Meteorological Congresses from 1872 onwards, with the necessary explanations, etc.

**Phytogeography.** **Henslow.**

Introduction to plant-ecology, for the use of teachers and students. By Rev. Prof. G. Henslow. London: E. Stanford, 1907. Size 7 × 5, pp. x. and 130. *Price* 2*s.* 6*d. Presented by the Publisher.*

This little book should do much to encourage the fascinating study of plant-ecology, or the relations of plant-life to the conditions of its habitat.

**Zoogeography—Mosquitoes.** **Theobald.**

A monograph of the *Culicidæ*, or mosquitoes. Mainly compiled from collections received at the British Museum. By Fred V. Theobold. Vol. 4. London, 1907. Size 8½ × 5½, pp. xx. and 640. *Illustrations. Price* 32*s.* 6*d. Presented by the British Museum* (*Natural History*).

## ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

**Anthropogeography.** *Petermanns M.* **52** (1906): 241–251, 265–270. **Woeikow.**

Verteilung der Bevölkerung auf der Erde unter dem Einfluss ner Naturverhältnisse und der menschlichen Tätigkeit. Von Prof. Dr. A. Woeikow. *With Maps.*

**Anthropogeography—Climate and Health.**

British Association Committee for the investigation of the effect of climate on health and disease. Memorandum on the climatic and other geographical data for the investigation. Size 10 × 8, pp. 6.

**Colonization.** *Z. Kolonialpolitik* **9** (1907): 19–54. **Halle.**

Die grossen Epochen der neuzeitlichen Kolonialgeschichte. Von Prof. Dr. E. von Halle.

**Commercial—Bananas.** **Hubert.**

Bibliothèque pratique du colon. Le bananier. Par Paul Hubert. Paris: H. Dunod et E. Pinat, 1907. Size 8 × 5, pp. x. and 222. *Illustrations. Price* 5 *fr.*

A concise monograph on the geographical distribution and economic uses of the various species of *Musa*, including that which supplies the Manila hemp of commerce.

**Ethnology—Culture.** **Balch.**

Comparative Art. By Edwin Swift Balch. Philadelphia: Allen, Lane, & Scott, 1906. Size 11 × 7½, pp. 212. *Presented by the Author.*

**Ethnology—Negritos, etc.** *Globus* **91** (1907): 8–14, 21–26, 37–44. **Fritsch.**

Ueber die Verbreitung der östlichen Urbevölkerungen und ihre Beziehungen zu den Wandervölkern. Von Gustáv Fritsch. *With Illustrations.*

**Historical Geography.** *Deutsche Erde* **5** (1906): 207–213. **Koblischke.**

Die Ortsnamenforschung als Unterlage historischer Nationalitätenforschung. Von Julius Koblischke.

**Historical—Cartography.** *Annalen Hydrographie* **34** (1906): 516–527. **Behrmann.**

Die Entstehung nautischer Kartenwerke Niederdeutschlands und ihr Einfluss auf die Kartographie. Von Dr. Walter Behrmann. *With Facsimile Maps.*

**Historical—Charts.** *Riv. G. Italiana* **13** (1906): 618–621. **Crinó.**

A proposito di due Carte di Navigare, che si trovano nella libreria del generale I. Pescetto. Del Prof. Sebastiano Crinó.

These charts are without author's name, but seem to date from the second half of the sixteenth century. One embraces the coast of Western Europe and North-West Africa, the other the Ægean and neighbouring coasts.

**Historical—Travels.** **Smith.**

The Generall Historie of Virginia, New England, and the Summer Isles. Together with the True Travels, Adventures and Observations, and A Sea Grammar. By Captain John Smith. 2 vols. Glasgow: J. MacLehose & Sons, 1907. Size 9 × 6, pp. (vol. 1) xxxiv. and 396; (vol. 2) xx. and 330. *Facsimile Maps and Illustrations. Price* 25*s. net. Presented by the Publishers.*

**Historical—Villani.** **Bellio.**

Vittore Bellio. Le cognizioni geografiche di Giovanni Villani. 2 parts. Rome, 1903–1906. Size 9 × 6½, pp. 114 and 44. *Maps.*

The first part forms a dictionary of all the place-names mentioned by Villani in his historical works (fourteenth century). In the second, the author discusses Villani's geographical knowledge.

**Historical—Voyages.** **Dampier and Masefield.**

Dampier's Voyages, consisting of a New Voyage round the World, a Supplement to the Voyage round the World, Two Voyages to Campeachy, a Discourse of Winds, a Voyage to New Holland, and a Vindication, in answer to the Chimerical Relation of William Funnell. By Captain William Dampier, edited by John Masefield. 2 vols. London: E. Grant Richards, 1906. Size 9 × 5½, pp. (vol. 1) x. and 612; (vol. 2) viii. and 624. *Facsimile Maps, Portrait, and Illustrations. Price* 25*s. net.*

**Language.** **Millard.**

L'Arabe parlé (Spoken-Arabic). Dictionnaire-Grammaire en lettres françaises (adapted into English). Par Bruce Millard. Paris: Garnier Frères; London: Dulau & Co., [1905]. Size 7 × 5, pp. x. and 164. *Presented by Messrs. Dulau & Co.*

**Medical Geography.** **Weber.**

Climatotherapy and Balneotherapy: the climates and mineral water health resorts (spas) of Europe and North Africa, including the general principles of climatotherapy and balneotherapy, and hints as to the employment of various physical and dietetic methods. By Sir Francis Weber and F. Parkes Weber. London: Smith, Elder, & Co., 1907. Size 10 × 6, pp. 834. *Price* 15*s. net. Presented by the Publishers.*

**Military Geography.** **May.**

Geography in relation to war. By Colonel E. S. May. London: H. Rees, Ltd. Size 8½ × 5½, pp. 62. *Maps and Plan. Price* 2*s. net. Presented by the Publishers.*

## GENERAL.

**Bibliography.** **Baschin.**

Bibliotheca geographica. Jahresbibliographie der gesamten geographischen Literatur. Herausgegeben von der Gesellschaft für Erdkunde zu Berlin. Bearbeitet von Otto Baschin. Band xii. Jahrgang 1903. Berlin: W. H. Kühl, 1907. Size 9 × 6, pp. xvi. and 518. *Presented by the Gesellschaft für Erdkunde zu Berlin.*

This volume has succeeded its predecessor with praiseworthy speed, giving hopes that future volumes may appear still nearer the date to which they refer.

**Educational.** **L'Estrange.**

A junior course of comparative geography, consisting of course "A" of "A progressive course of comparative geography." By P. H. L'Estrange. London: G. Philip & Son, 1907. Size 8½ × 5, pp. viii. and 240. *Maps and Illustrations. Presented by the Publishers.*

See review of the larger work in the May number (p. 560).

**Geographical Terms.** **Hochsteyn.**

Lucien Hochsteyn. Les termes de la géographie dans les langues du globe. Brussels: Misch et Thron, 1907. Size 11 × 7½. *Price* 10 *fr.*

The author has devoted an immense amount of labour to the task of collecting the equivalents of French geographical terms in a large number of different languages, but in certain directions the book leaves a good deal to be desired, both on the score of omissions and insufficient nicety of definition.

# NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

## EUROPE.

**England and Wales.** **Ordnance Survey.**

Sheets published by the Director-General of the Ordnance Survey, Southampton, from June 1 to 30, 1907.

**1 inch**—(third edition):—

In outline, sheets 80, 109, 187, 188, 191, 351. 1*s. each* (engraved).

Large sheet series, printed in colours, folded in cover or flat in sheets, 12, 14, 15, 21. *Price, on paper*, 1*s.* 6*d.*; *mounted on linen*, 2*s.*; *mounted in sections*, 2*s.* 6*d. each.*

**6-inch**—County Maps (first revision):—

**Carmarthenshire**, 8 S.E., 9 N.E., S.W., S.E., 13 S.W., 14 S.W., 15 S.E., 17 N.E., 23 S.W., S.E., 24 N.W., S.E., 25 S.W., S.E., 26 N.W., N.E., S.W., S.E., 27 N.W., 30 N.W., S.W. **Cornwall**, 2 S.W., 9 N.E., (9 S.E. and 9*a* S.W.). **Devonshire**, 96 S.E., 104 N.E., 111 N.E., 118 S.W. **Lincolnshire**, 35 S.W., 39 S.W., S.E., 41 N.W., N.E., S.W., 46 N.W., 48 S.W. **Norfolk**, 41 N.E., S.E., 42 N.W, S.W., 52 N.W., 53 N.W., N.E., S.W., S.E., 54 (N.W. and N.E.), S.W., S.E., 66 N.W., 87 N.W., S.W., 88 S.E. **Yorkshire** (First Revision of 1891 Survey), 262 S.E., 263 N.E., 264 N.W. 1*s. each.*

**25-inch**—County Maps (first revision):—

**Carmarthenshire**, XXVIII. 10; XXXVI. 5, 8, 9, 10, 11; XXXVII. 5, 9, 14; XLIV. 2, 5, 9, 10, 14; XLIX. 8; LI. 5. 3*s. each.* XXXVI. 12; XXXVII. 13; XLIV. 1, 13; LI. 1. 1*s.* 6*d. each.* **Cornwall**, XXXIX. 4; XL. 12, 16; XLI. 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16; XLII. 4, 5, 7, 9, 11, 12, 13, 14, 15; XLVIII. 12; XLIX. 4, 8, 10, 12, 13, 14, 15, 16; LI. 1, 4, 7, (9 and 10). **Lancashire** (First Revision of 1891 Survey), CVIII. 15; CIX. 1, 3, 5, 6, 13; CXV. 8, 11, (12 without areas); CXVI. 3. **Lincolnshire** (First Revision), XVII. 7; XVIII. 2, 4, 6, 7, 8, 9, 11, 14, 15; XXX. 2. 3*s. each.* XVI. (8 and 12). 1*s.* 6*d.* **Norfolk**, LXXIV. 8; LXXV. 5. **Pembrokeshire**, V. 8; X. 15; XVIII. 9, 10, 13, 14; XXIV. 1, 2, 5, 6, 9, 13, 14, 15, 16; XXV. 13; XXIX. 1, 2, 3, 4, 5, 8, 9, 10, 12; XXX. 1, 5, 9, 13; XXXVI. 1, 5, 9. 3*s. each.* XVIII. 8, 11; XXIV. 3, 7, 10, 11, 12; XXV. 9; XXX. 2, 6, 14; XXXVI. 2. 1*s.* 6*d. each.* **Yorkshire** (First Revision of 1891 Survey), CCXXX. 15; CCXXXVI. 15; CCXLV. 5, 9, 10, 12, 13, 15, 16; CCXLVI. 1, 5, 6, 9, 10, 14. 3*s. each.* **Kent** (Second Revision), XXII. 10; XXXV. 11; XXXVII. 4; LVI. 2, 3; LXVI. 14, 15, 16; LXVII. 4; LXVIII. 8; LXXIII. 6, 7, 10, 15; LXXIV. 3; LXXV. 2; LXXXIV. 2; LXXXVI. 3, 6, 8, (11 and 12). 3*s. each.*

**England and Wales.** **Geological Survey.**

**1-inch**—New Series. Colour printed. Worms Head, 246. Solid and Drift editions. 1*s.* 6*d. each.*

**6-inch**—Uncoloured. Brecknockshire, 50 N.W.; Glamorgan, 11 N.W., S.E., 18 S.E., 27 N.W., N.E., S.W., 35 N.W., S.E., 41 N.W., N.E. 1*s.* 6*d. each.*

(*E. Stanford, London Agent.*)

**Portugal.** **Direcção Geral dos Trabalhos Geodesicos, Lisbon.**

Carta de Portugal. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. Sheets: C—8, 9, 10, and 17. Lisbon: Direcção Geral dos Trabalhos Geodesicos e Topographicos, 1900–1904.

**Sweden.** **Generalstaben, Stockholm.**

General Karta öfver Sverige. Utgifven af Generalstaben. Scale 1 : 1,000,000 or 1 inch to 15·8 stat. miles. Stockholm: Generalstabens Litografiska Anstalt, 1906. *Presented by Baron E. G. E. Leijonhuvud.*

**Sweden.** **Generalstabens Topografiska Afdelning, Stockholm.**

Karta öfver Sverige. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets: 68, Sollefteå, N.O., S.O., S.V., 1905–1906.—Karta öfver Norrbottens Lan. Scale 1 : 200,000. Sheets: 45, Rödkallen, 1903; 46, Frostviken, 1903; 51, Skellefteå, 1906; 52, Munsfjället, 1904; 53, Alanäs, 1906; 58, Kolåsen, 1905; 65, Dufed, 1904; 66, Åre, 1903; 67, Östersund, 1903.—Höjdkarta öfver södra och mellersta

Sverige. Scale 1 : 500,000 or 1 inch to 7·8 stat. miles. Sheet VI.—Höjdkarta öfver norra Sverige. Scale 1 : 500,000 or 1 inch to 7·8 stat. miles. Sheets IV. and V. Stockholm: Generalstabens Topografiska Afdelning. *Presented by the Swedish Topographical Survey.*

## ASIA.

**Asia Minor.** **Kiepert.**

Karte von Kleinasien. Bearbeitet von Dr. Richard Kiepert. Scale 1:400,000 or 1 inch to 6·3 stat. miles. Sheet B II.—Brussa. Berlin: Dietrich Reimer (Ernst Vohsen), 1907. *Price 6m. each sheet.*

This excellent map is fast drawing to completion, only two more sheets now remaining to be published. The area of the present sheet extends approximately from 39° to 40° 45′ N. lat., and from 28° 10′ to 31° E. long.

**Dutch East Indies.** **Stemfoort and Siethoff.**

Atlas der Nederlandsche Bezittingen in Oost-Indië, naar de neiwe Cronnen samengesteld en aan de regeering opgedrägen door J. W. Stemfoort en J. J. ten Siethoff, Kapiteins van den Generalen Staf van het Nederlandsch-Indisch leger. Gereproduceerd, op last van het Department van Koloniën, aan de Topographische Inrichting te 's Gravenhage, onder leiding van le Directeur C. A. Eckstein. Sheet 4 (new edition), Midden-Java. Scale 1: 500,000 or 1 inch to 7·9 stat. miles. The Hague: Topographische Inrichting, 1907.

A sheet of a good general map of Java, printed in colours, and forming part of the large official Dutch Colonial Atlas. It extends from Cheribon on the west to Kediri on the east, and contains as an inset a plan of Semarang on the scale of 1 : 50,000, which place falls in about the centre of the sheet.

**Malay Peninsula.** **Revenue Survey, Taiping.**

Compiled plan of the Federated Malay States. Scale 1 : 760,320 or 1 inch to 12 stat. miles. Taiping: Revenue Survey Office, 1907. *Presented by J. P. Harper, Esq., Superintendent of Revenue Surveys, Perak.*

A small general map including Perak, Wellesley Province and Palau Pinang, Dindings, Pahang, Selangor, and Negri Sembilan. Although containing little detail, it will be useful as showing roads up to date, which are clearly given. The map is printed in colour.

## AMERICA.

**Brazil.** **Maia.**

Mappa da Viação Ferrea de São Paulo mostrando a Zona tributaria da E. F. Sorocabana. Organisado sob a superintendencia do Engenheiro Alfredo Maia. Scale 1 : 2,000,000 or 1 inch to 31·5 stat. miles. São Paulo: Secretaria de Agricultura do Estado de São Paula, 1907. *Presented by Sr. Frederico H. Sawyer, Directoria de Industria e commercio.*

Showing railways under construction and proposed in the state of São Paulo, Brazil. The map includes a larger area than this state, and reaches as far west as Bolivia and Paraguay. The extent to which the rivers are navigable is clearly shown. It is but a mere outline sketch, drawn for the special purpose indicated.

**Canada.** **Dept. of the Interior, Ottawa.**

Sectional map of Canada. Scale 1 : 190,080 or 1 inch to 3 stat. miles. Sheets: 15, Lethbridge, revised to April 8, 1907; 313, Brule, revised to April 6, 1907. Ottawa: Dept. of the Interior, Topographical Surveys Branch, 1907. *Presented by the Department of the Interior, Ottawa.*

**Ecuador.** **Galindo.**

Mapa geográfico-histórico de la Republica del Ecuador. Por el R. P. Fray Enrique Vacas Galindo de la Orden de Predicadores. Scale 1 : 1,500,000 or 1 inch to 32·7 stat. miles. Four sheets. Quito: Ministerio de Instruccion Publica y de Hacienda, 1906.

The claim this map has to be considered "historical" lies in the fact that it shows by various coloured lines and symbols the boundaries of Ecuador according to treaties and agreements from early dates, as interpreted in that republic, and according to the claims set up at various times by the neighbouring republics. Geographically, the map exhibits, in a somewhat rough and diagrammatic manner, the general relief and river systems, and gives the location of the many Indian tribes between the Andes and the upper waters of the Amazon. In this latter respect it

has a special value, as much of this information is from the author's personal knowledge. As a cartographical production the map is decidedly inferior to Wolf's large map, which has been utilized in its preparation. The limit of steamer navigation on the rivers is shown, and railways projected and working are indicated. A list of authorities consulted is given as a note on the map.

## GENERAL.

**World.** **Bludau and Handtke.**

Neue zeitgemässe Bearbeitung von Sohr-Berghaus Hand-Atlas über alle Teile der Erde. Entworfen und unter Mitwirkung von Otto Herkt herausgegeben von Professor Dr. Alois Bludau. Früher herausgegeben von F. Handtke. Neunte Auflage. Lieferung 10. Nos. 49. Italien, Blatt 3; 78. Südamerika (Uebersicht); 9, Deutsches Reich und Niederland (Physisch). Glogau: Carl Flemming, [1907]. *Price* 1m. *each part.*

These are three sheets of a new edition of this cheap popular German atlas. In the two physical maps of the German Empire and South America the highlands are tinted bright carmine, giving an unnecessarily abrupt change from the lower levels.

**World.** **Harmsworth.**

Harmsworth Atlas and Gazetteer. 500 maps and diagrams, and 105,000 references. Parts 17 and 18. London: The Amalgamated Press, Ltd., 1907. *Price 7d. each part.*

These parts contain the following maps: Part 17, Nos. 51–52, Belgium and Luxemburg; 107–108, Modern Palestine and Sinai Peninsula; 179–180, West Indies (industries and communications). Part 18, Nos. 57–58, Western Germany; 73–74, Spain and Portugal (industries and communications); 157–158, Canada.

**World.** **St. Martin and Schrader.**

Atlas Universel de Géographie construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoires, travaux géodésiques, etc., avec un texte analytique. Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. Sheet No. 51, Perse, Afghanistan et Inde Nord-Ouest. Paris: Hachette et Cie., 1907.

This forms part of the ten-sheet map of Asia which is being specially drawn and engraved for this atlas, and is the fifth sheet of the map to be published up to date. Like the others, it has been extremely well executed. The area includes Persia, Afghanistan, Baluchistan, Bokhara, North-West India, and the Arabian shores of the Persian gulf. Accompanying the sheet is a list of the authorities consulted in its compilation.

## Charts.

**Admiralty Charts.** **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during May, 1907. *Presented by the Hydrographer, Admiralty.*

### New Charts.

| No. | Inches. | |
|---|---|---|
| 3638 m | = 5·0 | France, south coast: Golfe de Fréjus and Rade d'Agay. 3*s.* |
| 2487 m | = 3·6 | United States, east coast: Portsmouth harbour. 2*s.* |
| 3659 m | = var. | South America. *Ports in Magellan strait:—Canal Condor and Lago de la Botella, Puerto Condor, Puerto Toro, Port Valderrama, Puerto Pomar. 2*s.* |
| 3651 m | = 3·6 | Chile. Plans in the Guaitecas islands:—Port Barrientos, Port Low, Port Melinka. 2*s.* |
| 3626 m | = 2·5 | Borneo:—Dumpil point to Gaya head, including Gaya island. 3*s.* |
| 3616 m | = 0·1 | Celebes:—Tomori gulf to Salayar strait, including Buton strait and gulf of Boni. 3*s.* |
| 1968 m | = 0·1 | China, east coast:—Formosa island and strait. 3*s.* |
| 1258 m | = 0·3 | Korea, west coast: Approaches to Seoul, including Techong (Sir James Hall) group. 4*s.* |
| 1969 m | = 1·5 / 4·9 | Japan: Ozuchi jima to Funoko sima. Plans:—Uno wan, Takamatsu ko. 3*s.* |
| 3629 m | = 0·11 | New Zealand:—Hokitika to Otago harbour, including Cook strait. 3*s.* |

### New Plans and Plans added.

| No. | Inches. | |
|---|---|---|
| 2116 m = | 5·0 / 10·2 | Denmark, Little Belt. Plans added:—Aarhus harbour, Svendborg harbour. 4*s*. |
| 158 m = | 2·4 | Italy, chart II. Cape Cavallo to Civita Vecchia and adjacent islands. Plan added:—Talamone bay. 3*s*. |
| 930 m = | 3·9 | Plans of anchorages between Borneo and New Guinea. New plan:—Wahai and Hatiling bay. 2*s*. |
| 3340 m = | 3·4 | Gulf of Tartary, northern sheet. Plan added: Angevo road. 3*s*. |
| 384 m = | 2·5 | Plans in Tasmania. Plan added:—East bay and Blackman bay. 2*s*. |
| 55 m = | 0·4 | Anchorages in New Britain, New Ireland, and New Guinea. New plan:—Byron strait to Nusa harbour. 2*s*. |

### Charts Cancelled.

| No. | | Cancelled by | No. |
|---|---|---|---|
| 2487 | United States, east coast:—Portsmouth harbour. | New plan. Portsmouth harbour | 2487 |
| 955 | Borneo:—Lutut point to Gaya head, including Gaya and Sapangar bays. | New chart. Dumpil point to Gaya head, including Gaya island | 3626 |
| 1968 | China, east coast:—Formosa island and strait. | New chart. Formosa island and strait | 1968 |
| 1258 | Korea, west coast:—Approaches to Seoul, with Sir James Hall group. | New chart. Approaches to Seoul, including Techong (Sir James Hall) group | 1258 |
| 1969 | Japan:—Ozuchi sima to Funoko sima. | New chart. Ozuchi sima to Funoko sima. Plans: Uno wan, Takamatsu ko | 1969 |

### Charts that have received Important Corrections.

No. 1150, east coast, river Thames:—Erith to Broadness. 3466, Germany:—Wilhelmshaven. 3261, Germany, Elbe river:—Outer light-vessel to Brunsbuttelkoog. 3262, Germany, Elbe river:—Brunsbuttelkoog to Hamburg. 696, Germany:—Kiel harbour. 185, Germany:—Port Swinemünde and approaches to Stettin. 284, Newfoundland:—Cow head harbour to Ste. Geneviève bay. 2843*a*. United States, east coast:—Chesapeake bay, sheet I. 192, Gulf of Mexico:—Galveston entrance. 40, India, west coast: Karachi harbour. 2160, Carimata strait. 1342, Cochin China: Fan-rang bay to Tongking gulf. 775, Cochin China: Approaches to Haifong. 1741, Canton river, sheet II.

(*J. D. Potter, Agent.*)

**Indian Ocean and Red Sea.** — **Meteorological Office.**

Monthly meteorological chart of the Indian Ocean north of 15° S. lat. and Red sea, July, 1907. London: Meteorological Office, 1907. *Price* 6*d. each. Presented by the Meteorological Office.*

**North Atlantic.** — **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, June, 1907. Washington: U.S. Hydrographic Office, 1907. *Presented by the U.S. Hydrographic Office.*

**North Atlantic and Mediterranean.** — **Meteorological Office.**

Monthly meteorological chart of the North Atlantic and Mediterranean, July, 1907. London: Meteorological Office, 1907. *Price* 6*d. each. Presented by the Meteorological Office.*

**North Pacific.** — **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, July, 1907. Washington: U.S. Hydrographic Office, 1907. *Presented by the U.S. Hydrographic Office.*

## PHOTOGRAPHS.

**Japan.** **Ponting.**

Japanese Studies. By H. G. Ponting, F.R.G.S. Collotyped by K. Ogawa, F.R.P.S. Yokohama: Kelly & Walsh. *Presented by H. G. Ponting, Esq.*

A most artistically arranged series of views of Japan, beautifully collotyped from photographs taken by H. G. Ponting, to whom this Society is already indebted for valuable additions to its collection. The views are most effective, and are printed on specially thin and soft art paper, folded so that a double thickness of the paper comes between the prints, with a most satisfactory result.

(1) Mount Fuji; (2) Evening at Matsushima; (3) The pine-clad shores of Nippon; (4) Miyajima; (5) The ivory-carvers; (6) Nara, the Heart of Old Japan; (7) The Abbot of Ikegami; (8) In Shiba park, Tokyo; (9) A summer shower in the woods; (10) Lake Motosu and Mount Fuji; (11) Meditation: a study at Gammar-ga-Fuchi; (12) O Tsune San; (13) At Matsushima; (14) Kameido Temple Garden, Tokyo; (15) Travelling by Kago in the Nikko mountains; (16) Fishing-boats at Kawasaki; (17) Himeji castle; (18) On the Hozu rapids; (19) A priest of Buddha; (20) Tamadare-no-taki, Hakone; (21) Tea-picking on the Shizuoka hills; (22) An Avenue of Torri at Inari, Kyoto; (23) The story book; (24) In an old garden; (25) The fortune-teller; (26) The embroiderer; (27) At fair Miyajima; (28) Wistaria; (29) The Pines of Mio; (30) A study by the Shoji; (31) The Avenue at Nikko; (32) A prayer-wheel at Zenkoji; (33) A glen on the Hozu-gawa; (34) A priest of Kunozan; (35) On a pilgrimage to Nara; (36) The bronze sculptor; (37) The Nara Pagoda; (38) A study of a Geisha; (39) Kinkakuji, Kyoto; (40) In Lotus land; (41) In a Japanese garden; (42) Painting pottery; (43) The golden days of autumn; (44) November at the flower show; (45) In winter dress; (46) The potter at his wheel; (47) Moonlight at Kiyomizu, Kyoto; (48) December in Japan; (49) The Daiya river at Nikko; (50) Lake Kawaguchi from Torii zaka; (51) Lake Kawaguchi; (52) Sayonara.

**Northern Nigeria.** **Stanley.**

Seventy photographs of Northern Nigeria, taken by the Hon. Edward Stanley. *Presented by the Hon. Edward Stanley.*

An interesting set of small photographs taken by Mr. Stanley a few months ago during his travels as a Government official. The titles are as follows:—

(1–4) The beach, Lokoja; (5) Workshops, Lokoja; (6) River Niger, looking upstream from Lokoja; (7–11) Osakwa Kwotto village; (12) Toto, jungle; (13) Toto, native bridge; (14 and 15) Toto, stream; (16) Toto, path to town; (17) Bassa woman; (18–24) Toto market; (25) Niegbe, Bassa village; (26) Path near Niegbe; (27) Gwargwada, main street; (28) Gwargwada, market-place; (29) Gwargwada, King's house; (30) Gwargwada, tobacco field and jungle from inside village; (31) Kurudu, looking south; (32) Kurudu, looking east; (33 and 34) Inside Kurudu; (35–39) Epaou, Hill Afo village; (40–42) Epaou, path between two villages; (43–45) Jemaa-n-Darroro, rest house; (46) Looking north-west from Jemaa-n-Darroro, rest house; (47) Kagoro hills; (48) Fulani, Nupe; (49) Fulani; (50 and 51) Fulani, full dress; (52–58) Fulani, Kagoma district; (59) Town Fulani from Jemaa-n-Darroro; (60) Pagan women from Moroa; (61) Moroa pagan village; (62) Gidda-n-dan Attar, Kaje pagan village, showing cactus hedges; (63 and 64) Gidda-n-dan-Attar; (65) Gidda-n-Sariki-n-Togwoi, Kaje village; (66–68) Aso, Kagoma pagans; (69) Kagoma hut, unfinished, at Aso; (70) View from inside Aso village.

**Portuguese East Africa.** **Reid.**

Seventy-two photographs of game and typical scenery in Portuguese East Africa, taken by Messrs. C. A. and H. W. Reid. *Presented by Messrs. C. A. and H. W. Reid.*

An excellent idea of the amount of game in this part of Africa can be obtained by an inspection of these photographs, which are specially interesting from the fact that they represent the fauna of this part of Africa in connection with its immediate surroundings. Some of the photographs, such as Nos. 42, 44, and 45, are most striking, and may perhaps be considered quite unique.

(1) Bushbuck head, Gorongoza; (2) Bushbuck ram, Gorongoza; (3) Bushbuck ram, near Shitenga's; (4) Buffalo bull, near Sebouko, Sheringoma; (5) Buffalo bull head, near Sebouko, Sheringoma; (6) Cutting up buffalo, near Sebouko, Sheringoma; (7) Jennet cat, near Mapanda's, Gorongoza; (8) Civet cat, on the Urema plain, Gorongoza; (9) Crocodile, Sungwe, Urema plain; (10) Eland bull, near Seende, Gorongoza; (11) Cutting up a hartebeeste on the road to Seende; (12) Hartebeeste cow, Majamba, Sheringoma; (13) Hartebeeste bull, near Mapanda's, Gorongoza; (14) Hyena dog,

Urema plain, Gorongoza; (15) Hyena bitch, Urema plain; (16) Hippopotamus' head, Urema plain; (17) Gathering in a hippopotamus, Urema plain; (18) Hippopotamus bull, Urema plain; (19) Impala ram; (20) Impala ram, near Somenyei's, on the Vinduzi river; (21) Carrying in a lion, Urema plain; (22–24) Lion, Urema plain; (25 and 26) Lion's head, Urema plain; (27) Male and female Dribi, near Seende, Gorongoza; (28) Reedbuck ram, near Seende; (29) Reedbuck ram, near Mapanda's; (30) Sable antelope cow, near Mapanda's; (31) Wharthog sow, Urema plain; (32) Cutting up a wildebeeste, Urema plain; (33) Wildebeeste bull, Urema plain; (34) Water-buck with one horn, Urema plain; (35) Wharthog head, near Mombez, Gorongoza; (36) Zebra, Mombez; (37) Water-buck, near Mombez; (38) Native huts at Mapanda's village; (39) Mapanda's residence; (40) Boys at meal-time; (41) Ducks and geese on the Sungwe, Urema plain; (42) Mob of elephant crossing the Uremi plain; (44) Mob of wildbeeste on the Urema plain; (45) Mob of zebra on the edge of the Urema plain; (46) The "Maskaji Sungwe," on the Urema plain; (47) The Urema plain, looking towards the Sungwe; (48) Baobab tree; (49) Burning the grass on the Urema plain; (50) Boy and fish-trap in one of the channels draining the Urema plain; (51) Beira from the sea; (52) The start of the trip from Beira; (53) The junction of the Pungwe and Madingue Dingue rivers; (54) The mouth of the Urema river; (55) A hippo pool on the Vinduzi river; (56) A hippo pool on the Vinduzi river and Mount Bungo; (57) Looking south-east from the top of Mount Bungo; (58) Crossing the Urema river at Bombah; (59) The Yadouhi river; (60) A shooting party on the Urema plain; (61) Crossing the Urema plain in Machillas; (62) The headquarters of the Gorongoza Company; (63–70) Nine lions and one leopard, shot by Mr. H. W. Reid; (71) Mr. H. W. Reid.

**Spain.** **Sternberg.**

Sixty-six photographs of Spain, taken by F. Sternberg, Esq. *Presented by F. Sternberg, Esq.*

These photographs were taken by Mr. Sternberg during a recent tour in Spain. Although perhaps more historical than geographical, many of them are of considerable interest.

(1) Bridge at Ronda; (2) Curious inverted arch at Ronda. Granada:—(3) El Generalife; (4) Lion's court, Alhambra; (5) Interior of court at the Alhambra, and arch; (6) Arch at Alhambra; (7) Palace of Ferdinand and Isabella. Seville:—(8) The cathedral; (9) Entrance to the orange court at cathedral; (10) Torre de Oro, with cathedral in distance; (11) Man and donkey; (12) Calle Sièrpes. Cordova:—(13) Tower of cathedral; (14) Interior of cathedral; (15) Entrance to courtyard of cathedral; (16) Children in Orange court at cathedral; (17) Entrance to house of Geronimo Paez; (18) Bridge; (19) Puerta de la Verdad; (20) Tower at the end of the bridge opposite the city. Toledo:—(21) Alcantara bridge; (22) San Martin bridge; (23) Church of San Juan de los Reyes. Madrid:—(24 and 25) The Puerta del Sol; (26) The Royal palace; (27) Street-hawker with imitation ironclad; (28) El Escorial; (29) City of Avila, showing old walls. Segovia:—(30) The cathedral; (31) Part of the cathedral from the Plaza; (32 and 33) The walls of Segovia; (34) View of Segovia, showing aqueduct; (35) Aqueduct, and snow-capped mountains behind; (36) Old Segovia; (37) Segovia and snow-capped mountains; (38) Convent, El Parral; (39) El Alcazar; (40) The aqueduct; (41) Casa de los Picos; (42) Plaza de la Constitucion; (43) Puerta de Madrid; (44) Puerta de San Cebian and walls; (45) Patio in palace of the Marquis Arco. Burgos:—(46) View of Burgos and cathedral from the castle; (46*a*) Principal entrance to cathedral; (47) A bit of the cathedral; (48) Entrance to Pellejeria cathedral; (49) The cloisters, Pellejeria cathedral; (50) Interior of Burgos cathedral, showing processional chariot; (51) Bishop's palace; (52) Arms of the Cid; (53) Plaza mayor; (54) Old house; (55) Casa de Miranda; (56) Arco de Santa Maria; (58) Las Huelgas convent; (59 and 60) Las Huelgas convent church; (61) Graves of British soldiers who fell before San Sebastian in 1836 whilst fighting against the Carlists. Fuenterrabia:—(62) General view of Fuenterrabia; (63) Calle mayor; (64) Calle Pampinot; (65) Calle de Lastiendas; (66) The town gate.

**N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.**

# CENTRAL AFRICA

## Route of the ALEXANDER-GOSLING EXPEDITION from the RIVER NIGER TO THE RED SEA 1904-7.

Scale, 1:8,000,000 or 1 Inch = 126·26 Stat. Miles.

100 50 0 100 200 300

**Reference.**

Land routes thus
Water " "
Railways "
Heights in feet

**Note.**

The route from Ibi to Lake Chad is from a latitude and azimuth traverse, and triangulation, adjusted in longitude to recent telegraphic determinations. A map of this part of the work on a scale of 1:1,000,000, was published in the Geographical Journal for Feb. 1906.
Lake Chad (N° I) is constructed from boat and prismatic compass traverses, by Lieut. Boyd Alexander, and Mr. P. A. Talbot, adjusted to Capt. Tilho's astronomically determined positions of Mouth of R. Yo, Seyarum, Wunnda, and Bul, and to latitudes by sextant observations taken by Mr. Talbot in the north part of the lake, indicated thus ⊙
The River Bamingi (N° II), by Lieut. Boyd Alexander, and Capt. G.B. Gosling, is from a boat and prismatic compass traverse, adjusted to several positions fixed in latitude by Capt. G.B. Gosling, indicated thus ⊙
The Rivers Kibali and Yei (N° III & IV) by Lieut. Boyd Alexander, are from boat and land traverses with prismatic compass, adjusted to Comm.r Lemaire's astronomically determined positions of Dungu, Faraggi, Yei, Wandi, Old Raffai and Raffai; and Ghaba Shambi by Col. Sir C.M. Watson, K.C.M.G., R.E.

Conical Projection with Standard Parallels 5° and 17°

## Map of part of THE RIVER BAMINGI from a survey by LIEUT. BOYD ALEXANDER (Rifle Brigade) AND CAPT G.B. GOSLING (Rifle Brigade) SEPT 1905.

Scale, 1:1,000,000 or 1 Inch = 15·78 Stat. Miles.

10 5 0 10

N° II

## Map of THE KIBALI RIVER from a survey by LIEUT. BOYD ALEXANDER (RIFLE BRIGADE) JULY 1906.

Scale, 1:500,000 or 1 Inch = 7·89 Stat. Miles.

5 0 5 10

N° III

Published by the Royal Geogr

Map
of part of
# LAKE CHAD
from surveys by
LIEUT. BOYD ALEXANDER (RIFLE BRIGADE)
AND
P. A. TALBOT, B.A.
DEC. 1904 – MAY 1905.

Scale, 1:1,000,000 or 1 Inch = 15·78 Stat. Miles
10 5 0 10 20

Land routes
Water "
Depths in feet

KANEM
Wunnda
KANEM
Karnak
Karinta
Mudie
Sowa
Yowa
Karrarugga I.
Marbu
BUDUMA
Marsh, reed banks, marsh and soft mud
Machilella
Marsha
KURI
HAD
Haja-el Hamis
Nº I
Rimilo
R. Shari

Map
of the
# RIVER YEI
from surveys by
LIEUT. BOYD ALEXANDER
(Rifle Brigade)
OCT. 1906.

Scale, 1:1,000,000 or 1 Inch = 15·78 Stat. Miles
10 5 0 10

Port Sudan
RED SEA
Suakin
Abu Hamed
Dongola
Handak
Karima
Merowe
Dongola
Thamiam
Berber
River Atbara
River Nile
Shendi
EGYPTIAN SUDAN
Omdurman
Khartum
El Ducim
El Obeid
Renk
Kelut
Kodok
Taufikia
Sobat
R. Sobat
Bahr el Arab
Bahr el Ghazal
Bahr el Jebel
Bahr el Zeraf
R. Kir
Bahr el Homr
Hofrat el Nahas
Kahuka
Meshra er Rek
BAHR EL GHAZAL
Dem Zuber
Rumbek
Ghaba Shambi
Bor
R. Sue
R. Tonj
R. Tonj or Loka
Tambura
Yenhari (Amadi)
Raffai
Lado
Rafai
Zemio
R. Bomu
Wandi
Refaf
Ft. Berkeley
LADO ENCLAVE
Mira
Ndoruma
R. Uele
Jabbir
Bambik (Bomokandi)
Sigasi
Angu
Bima
Pompari
Mangara
Mt. Angba
BAKANGO
Dungu
R. Kibali
R. N'Soro
Yankerekhovenville (N'Soro)
Momvu
Monbuttu
R. Bomokandi
R. Ira or Nakwa
Abas
Paruggo
Nimule
Wadelai
Albert Nyanza
Victoria Nile
Albembo
R. Bubi
R. Welle
R. Uele
R. Shinko
R. Warora
R. Bomu
R. Bili
R. Dungu or Kibbi
Faraggi
2687
Goddo
R. Abijo
R. Ara
Bugga
Merissa
AZANDI
Ngadda Rapids
Tsara Rapids
Biti Rapids
Current 1¾ mls per hr.
R. Tingba
Nao
Mt. Barondo
I'Mbari
I'Mbaddu
I'Mbaiga
Gudima
R. Atchimiga
R. Mbomu
BAKANGO
Magombo
Kobai Rapids
Current 1¾ mile per hr.
Mimosa
N'Doromo
Open grass country
I'Zumbo
R. Kibali
Oduma
R. Orru
Subani
BARI
R. N'Soro
LOGO
Dunmuru Rapids
Magombo
Dodo
Ombumbi
I'Ngiviku Rapids
I'Zumbo
Vankerekhovenville (N'Soro)
Kuru
R. Kuru
Bush
N'SORO HILLS
Bolangi
Kaia
GAIMA HILLS
I'Ndikolu
R. Matuli
MOMVU
Open grass country
MOMBUTTU
Yuggo Pk.
To Kelima
Gudima
Ghaba Shambi
Bahr el Jebel
Shambi
Mimosa bush
Bir Tirali
Gimera
DINKA
Nabaga
El Bettain
El Daradeba
Vast marsh and sudd
Uninhabited
Mimosa bush
Cultivation
Chirongo
Lau
To Rumbek
R. Sedgwute or Yei
Open grass country
Current 2 mls per hr.
Shate
Alell Rapid
Abwoll
DINKA
Current 2½ mls per hr.
R. Lau or Yei
Kallu
Dinka Villages
Open grass country
Wau
Lual
Akkai
R. Doggarith or Yei
DINKA
Open grass country
Kutta
A. Todt
R. Tatalli
Parnati
Lehki
Pellikirri
Zolla
Madungu
Arrawa (Burr) 1890
R. Riddi or Yei
Gallamorli
R. Dungwarri
Dori
Bush
Moko
R. Yeri
Koti
R. Terwun
Liko
Arpai
Mussakari
R. Kujubuli
R. Murreru
Kerolli
Kalerri
BITI
R. Tipaki
R. Didre
Yenhari (Amadi)
R. Hoho
Bush
Digo
Boundary between Egyptian Sudan and Lado Enclave (Leased to Congo State)
Raffai 2016
(Injetti Mabi)
Derimba Rapids
Dongura Rapids
Motuta Mingi
Wolla
Owurra Rapids
Meritukka Rapids
Mugia
Benghi Rapids
Wurrjya
Ovvako
Buduga Rapids
R. Murri
R. Mbomu
Ambelio Rapids
Lisserri Rapids
Urru Rapids
Murrpai
MISA
Gerwinga Rapids
Luri Rapids
R. Bodoyo
R. Laka
R. Kibilla Rapids
R. Gaia
2805
Old Raffai
R. Bibi
R. Melo
R. Bendda
R. Chaud Rapids
Terqu Rapids
Surur
Wandi
2862
Wandi Rapids
R. Tari
R. N'Zoro or Yei
Kapi
Badoi
R. Numviri
R. Kobwa
R. Kwata
R. Kimbi
Current 1¾ mls per hr.
Beringa
Yei
2863
Nº IV

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## LATITUDE

| Name of Place. | Method of Obs |
|---|---|
| Mien-tien ... ... | Ex-meridian alts. |
| Yün-lung Chou ... | Meridian alt. of S |
| Fei-lung-ch'iao ... | Meridian alt. of S |
| La-ha ... ... ... | Meridian alt. of |
| Lu-kou ... ... ... | " " |
| Mao-chao ... ... | Ex-meridian alts. |
| Lan-chia-ti ... ... | Meridian alt. of S |
| Near Mêng-chao... | " " |
| Lao-yang-ka... ... | Meridian alt. of |
| Mali Hka ... ... | Meridian alt. of S |

## LONGITUDE

| Name of Place. | Method of Ob |
|---|---|
| Fei-lung-ch'iao ... | Sun E. ... ... |
| La-ha ... ... ... | Star E. ... ... |
| Lu-kou ... ... ... | Star W. ... ... |

NOTE.—The above observations
sextant, and a mercurial artificial hori
a half-chronometer watch. The longit
metric differences, must be considere
the rate of the watch was unsatisfact

Conical Projection with Standard Parallels 23° and 27°

Published by the Royal G

## TUDES.

| of Observation. | Latitude N. |
|---|---|
| n alts. of Polaris ... | 22° 38′ 12″ |
| lt. of Sirius ... ... | 25 48 9 |
| lt. of Sun ... ... ... | 25 47 20 |
| lt. of Rigel ... ... | 25 50 22 |
| ,, ,, ... ... | 25 50 46 |
| n alts. of Polaris ... | 26 5 8 |
| lt. of Sun... ... ... | 26 29 30 |
| ,, ,, ... ... ... | 26 2 9 |
| lt. of Rigel ... ... | 26 12 50 |
| lt. of Sun... ... ... | 26 21 10 |

## TUDES.

| d of Observation. | Longitude E. |
|---|---|
| ... ... ... ... ... | 99° 10′ 12″ |
| ... ... ... ... ... | 99 3 30 |
| ... ... ... ... ... | 98 54 52 |

ations were made with a 7 inch al horizon, times being noted by e longitudes, which are by chrono- sidered as approximate only, as atisfactory.